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5. A psychological study of juvenile delinquency by group methods—J. W. BRIDGES AND K. M. B. BRIDGES
6. The influence of puberty praecox upon mental growth—A. GESELL

VOLUME 2—1927

1 & 2. The mind of a gorilla—R. M. YERKES
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4. Family similarities in mental-test abilities—R. R. WILLOUGHBY
5. Coordination in the locomotion of infants—L. H. BURNSIDE
6. The mind of a gorilla: Part II. Mental development—R. M. YERKES

VOLUME 3—January-June, 1928

1. An experimental study of the olfactory sensitivity of the white rat—J. R. LIGGETT
2. A photographic study of eye movements in reading formulae—M. A. TINKER
3. An experimental study of the East Kentucky mountaineers—N. D. M. HIRSCH
4. Responses of foetal guinea pigs prematurely delivered—G. T. AVERY
5. Objective differentiation between three groups in education (teachers, research workers, and administrators)—M. B. JENSEN
6. The effect of segregation on the sex behavior of the white rat as measured by the obstruction method—M. JENKINS

VOLUME 4—July-December, 1928

1. Observation and training of fundamental habits in young children—E. A. BOTT, W. E. BLATZ, N. CHANT, AND H. BOTT
2 & 3. Determination of a content of the course in literature of a suitable difficulty for junior and senior high school students—M. C. BURCH
4 & 5. Methods for diagnosis and treatment of cases of reading disability—M. MONROE
6. The relative effectiveness of lecture and individual reading as methods of college teaching—E. B. GREENE

VOLUME 5—January-June, 1929

1. The age factor in animal learning: I. Rats in the problem box and the maze—C. P. STONE
2. The effect of delayed incentive on the hunger drive in the white rat—E. L. HAMILTON
3. Which hand is the eye of the blind?—J. M. SMITH
4. The effect of attitude on free word association-time—A. G. EKDAHL
5. The localization of tactual space: A study of average and constant errors under different types of localization—L. E. COLE
6. The effects of gonadectomy, vasotomy, and injections of placental and orchic extracts on the sex behavior of the white rat—H. W. NISSEN

VOLUME 6—July-December, 1929

1. Learning and growth in identical infant twins: An experimental study by the method of co-twin control—A. GESELL AND H. THOMPSON
2. The age factor in animal learning: II. Rats on a multiple light discrimination box and a difficult maze—C. P. STONE
3. The acquisition and interference of motor habits in young children—E. MCGINNIS
4. A vocational and socio-educational survey of graduates and non-graduates of small high schools of New England—A. D. MUELLER
5 & 6. A study of the smiling and laughing of infants in the first year of life—R. W. WASHBURN

VOLUME 7—January-June, 1930

1. Tensions and emotional factors in reaction—E. DUFFY
2. Teacher influence on class achievement: A study of the relationship of estimated teaching ability to pupil achievement in reading and arithmetic—H. R. TAYLOR
3 & 4. A study of the effect of inverted retinal stimulation upon spatially coordinated behavior—P. H. EWERT
5. A study of the mental development of children with lesion in the central nervous system—E. E. LORD
6. An experimental study upon three hundred school children over a six-year period—N. D. M. HIRSCH

VOLUME 8—July-December, 1930

1. The amount and nature of activities of newborn infants under constant external stimulating conditions during the first ten days of life—O. C. IRWIN
2. Race and social differences in performance tests—S. D. PORTEUS, *et al.*
3. Language and growth: The relative efficacy of early and deferred vocabulary training, studied by the method of co-twin control—L. C. STRAYER
4. Eye-movements and optic nystagmus in early infancy—J. M. MCGINNIS
5 & 6. Reactions of kindergarten, first-, and second-grade children to constructive play materials—L. FARWELL

VOLUME 9—January-June, 1931

1 & 2. The status of the first-born with special reference to intelligence—H. H. HSIAO
3 & 4. An experimental study of bright, average, and dull children at the four-year mental level—H. P. DAVIDSON
5. An historical, critical, and experimental study of the Seashore-Kwalwasser test battery—P. R. FARNSWORTH
6. A comparison of difficulty and improvement in the learning of bright and dull children in reproducing a descriptive selection—F. T. WILSON

VOLUME 10—July-December, 1931

1. A comparative study of a group of southern white and negro infants—M. B. MCGRAW
2 & 3. An experimental study of prehension in infants by means of systematic cinema records—H. M. HALVERSON
4. The limits of learning ability in kittens—A. M. SHUEY
5 & 6. The effect of habit interference upon performance in maze learning—O. W. ALM

VOLUME 11—January-June, 1932

1. General factors in transfer of training in the white rat—T. A. JACKSON
2. The effect of color on visual apprehension and perception—M. A. TINKER
3. The reliability and validity of maze experiments with white rats—R. LEEPER
4. A critical study of two lists of best books for children—F. K. SHUTTLEWORTH
5 & 6. Measuring human energy cost in industry: A general guide to the literature—R. M. PAGE

VOLUME 12—July-December, 1932

1. Family resemblances in verbal and numerical abilities—H. D. CARTER
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5 & 6. Differential reactions to taste and temperature stimuli in newborn infants—K. JENSEN

VOLUME 13—January-June, 1933

1. A critique of sublimation in males: A study of forty superior single men—W. S. TAYLOR
2. A study of the nature, measurement, and determination of hand preference—H. L. KOCH, *et al.*
3. The growth and decline of intelligence: A study of a homogeneous group between the ages of ten and sixty—H. E. JONES AND H. S. CONRAD
4. The relation between the complexity of the habit to be acquired and the form of the learning curve in young children—M. L. MATTSON
5. Eating habits in relation to personality development of two- and three-year-old children: A study of sixty-nine

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VOLUME 14—July-December, 1933

1. Mental growth during the first three years: A developmental study of sixty-one children by repeated tests—N. Bayley
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3. The objective measurement of emotional reactions—H. V. Gaskill
4. Development of behavior in the fetal cat—J. D. Coronios
5. A study of certain language developments of children in grades four to twelve, inclusive—L. L. LaBrant
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VOLUME 15—January-June, 1934

1. Studies in the psychology of tone and music—P. R. Farnsworth
2. Motor learning of children in equilibrium in relation to nutrition—E. L. Beebe
3. Discrimination limens of pattern and size in the goldfish *Carassius auratus*—J. B. Rowley
4. Limits of learning ability in the white rat and the guinea pig—B. F. Riess

5 & 6. The limits of learning ability in rhesus monkeys—H. A. Fjeld

VOLUME 16—July-December, 1934

1. A statistical study of ratings on the California Behavior Inventory for Nursery-School Children—H. S. Conrad
2. An eye-movement study of objective examination questions—A. Frandsen
3. An experimental study of constitutional types—O. Klineberg, S. E. Asch, and H. Block
4. The development of a battery of objective group tests of manual laterality, with the results of their application to 1300 children—W. N. Durost

5 & 6. An experimental study in the prenatal guinea-pig of the origin and development of reflexes and patterns of behavior in relation to the stimulation of specific receptor areas during the period of active fetal life—L. Carmichael

VOLUME 17—January-December, 1935

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3. The limits of learning ability in cebus monkeys—A. M. Koch
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5. On intelligence of epileptic children—E. B. Sullivan and L. Gahagan
6. A study of the play of children of preschool age by an unobserved observer—D. L. Cockrell

VOLUME 18—January-December, 1936

1. Sex differences in variational tendency—Q. McNemar and L. M. Terman
2. The process of learning to dress among nursery-school children—C. B. Key, M. R. White, M. P. Honzik, A. B. Heiney, and D. Erwin
3. A study of the present social status of a group of adults, who, when they were in elementary schools, were classified as mentally deficient—W. R. Baller
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5 & 6. Studies in aggressiveness—L. Bender, S. Keiser, and P. Schilder

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3. Domination and integration in the social behavior of young children in an experimental play situation—H. H. Anderson
4. The sequential patterning of prone progression in the human infant—L. B. Ames

VOLUME 20—January-December, 1938

1. The relationship between characteristics of personality and physique in adolescents—P. S. de Q. Cabot
2. Behavior problems of elementary school children: A descriptive and comparative study—I. Y. Masten
   Graphic representation of a man by four-year-old children in nine prescribed drawing situations—P. F. Gridley
3. Differences between two groups of adult criminals—R. S. Tolman
4. A comparative study by means of the Rorschach method of personality development in twenty pairs of identical twins—E. Troup
   Individual differences in the facial expressive behavior of preschool children: A study by the time-sampling method—C. Swan

VOLUME 21—January-December, 1939

1. An experimental analysis of "level of aspiration"—R. Gould
2. Some light on the problem of bilingualism as found from a study of the progress in mastery of English among preschool children of non-American ancestry in Hawaii—M. E. Smith
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   The capacity of the rhesus and cebus monkey and the gibbon to acquire differential response to complex visual stimuli—W. E. Galt
4. The social-sex development of children—E. H. Campbell

VOLUME 22—January-December, 1940

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4. Learning by children at noon-meal in a nursery school: Ten "good" eaters and ten "poor" eaters—J. B. McCay, E. B. Waring, and P. J. Kruse
   Studies in the interpretation of play: I. Clinical observation of play disruption in young children—E. H. Erikson

VOLUME 23—January-June, 1941

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   Infant development under conditions of restricted practice and of minimum social stimulation—W. Dennis
   An analysis of the mental factors of various age groups from nine to sixty—B. Balinsky
2. Factors influencing performance on group and individual tests of intelligence: I. Rate of work—M. W. Bennett
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1. Twins *T* and *C* from infancy to adolescence: A biogenetic study of individual differences by the method of co-twin control—A. Gesell and H. Thompson
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   Measurement of the size of general English vocabulary through the elementary grades and high school—M. K. Smith
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   A genetic study of geometrical-optical illusions—A. Walters
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Genetic Psychology Monographs *(continued)*

VOLUME 26—July-December, 1942
1. The critical frequency limen for visual flicker in children between the ages of 6 and 18—V. L. Miller
Some factors determining handedness in the white rat—K. L. Wentworth
2. Motivation and behavior—E. Frenkel-Brunswik

VOLUME 27—January-June, 1943
1. Comparison of children's personality traits, attitudes, and intelligence with parental occupation—N. R. Maddy
2. A comparative study of mental functioning patterns of problem and non-problem children seven, eight, and nine years of age—M. L. Pignatelli

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1. Separation anxiety in young children: A study of hospital cases—H. Edelston
2. Correlates of vocational preferences—W. A. Bradley, Jr.

VOLUME 29—January-June, 1944
1. Mental changes after bilateral prefrontal lobotomy—S. D. Porteus and R. D. Kepner
2. A twin-controlled experiment on the learning of auxiliary languages—B. Price, W. J. Kostir, and W. M. Taylor

VOLUME 30—July-December, 1944
1. A method of administering and evaluating the thematic appreciation test in group situations—R. M. Clark
2. A study of anxiety reactions in young children by means of a projective technique—R. Temple and E. W. Amen

VOLUME 31—January-June, 1945
1. The evolution of intelligent behavior in rhesus monkeys—B. Weinstein
2. Perceptual behavior of brain-injured, mentally defective children: An experimental study by means of the Rorschach technique—H. Werner

VOLUME 32—July-December, 1945
1. A clinical study of sentiments: I.—H. A. Murray and C. D. Morgan
2. A clinical study of sentiments: II.—H. A. Murray and C. D. Morgan

VOLUME 33—January-June, 1946
1. Interpretation of spontaneous drawings and paintings—T. S. Waehner
Preferences for sex symbols and their personality correlates—K. Franck
2. Outstanding traits: In a selected college group, with some reference to career interests and war records—F. L. Wells and W. L. Woods

VOLUME 34—July-December, 1946
1. The relation of emotional adjustment to intellectual function—J. L. Despert and H. O. Pierce
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EFFECTS OF DIFFERENTIAL AFFERENT FEEDBACK ON INSTRUMENTAL GSR CONDITIONING*

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A. INTRODUCTION

In recent years, a large and burgeoning literature has developed, demonstrating that autonomic events can be altered by instrumental conditioning techniques (3, 5). Such work is of considerable theoretical interest inasmuch as it contradicts several major classifications of learning (6, 13) and contrasts with early attempts to induce autonomic change through reinforcement manipulation (11, 13).

The majority of studies which have demonstrated successful instrumental modification of the galvanic skin response (GSR) have utilized spontaneous fluctuations (SFs) in GSR activity as the response measure. SFs are typically low amplitude changes in skin conductance whose occurrence is not correlated with discernible stimulus events (7). It is interesting to note that this particular response has been found conditionable, since some early theorists had speculated that autonomic events are not instrumentally modifiable because of limited afferent feedback (6).

If this line of reasoning is followed, it would be anticipated that response measures characterized by greater feedback properties would facilitate the conditioning process. This contention was investigated in the present study by eliciting differential skin conductance across groups by electric shock. Once skin conductance was increased, *S*s were reinforced for maintaining the response relative to preshock level.

In addition to afferent feedback, the present study investigated the role of somatic mediation in the conditioning process. It has been shown (10, 12) that autonomic and somatic events are often highly correlated. In spite of this, very few studies have attempted to assess the possible mediating role of such somatic events. In the present study, respiration rate, respiration amplitude, and electromyogram (EMG) amplitude were subjected to analysis in addition to GSR. Further, a postexperimental questionnaire was administered to determine *S*s' perception of the reinforcement contingency.

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B. METHOD

1. *Subjects*

Fifty-five undergraduate students at the University of North Carolina served as *S*s. Four males and one female served in each of the 11 experimental conditions.

2. *Apparatus*

*S*s were seated in an overstuffed chair in a room adjacent to that of *E*. Except for the shock and recording electrodes, all physiological recording equipment was located in the *E* room. A red light was mounted approximately three feet in front of *S*. White noise was used to mask ambient sounds. Electric shocks were delivered by Beckman electrodes placed on the second and fourth fingers of the left hand.

All physiological data were recorded on an Offner type R dynograph. Skin resistance was measured with a Yellow Springs Model Fels dermohmmeter, which impresses a constant current of 70 microamps. Palm-to-palm recordings were obtained with the use of zinc electrodes (3.14 sq cm) and zinc sulfate-agar electrode paste. Respiration amplitude and rate were measured pneumatically and transduced by a Statham 0-5 cm hg strain gauge. EMG was recorded by Beckman Biolectric electrodes placed on the pronator teres muscle of the left arm. All electrode sites were cleaned with alcohol before placement. A Gra-Lab Universal Timer was used to time the total session and determine intershock intervals.

3. *Experimental Design*

*S*s were divided into three experimental or reinforcement (R) groups of five *S*s per group which differed in terms of the intensity of electric shock received. Shock intensity was determined on the basis of verbal report, being either at "threshold," "pain," or "medium" (average of threshold and pain) intensity. All R *S*s received a total of 16 shocks during the experiment with a four-minute intershock interval. After each of the first 12 shocks, and hence each increase in skin conductance, a red light mounted directly in front of *S* was briefly flashed for each five-second period that GSR amplitude was above its preshock level. Each such light onset was exchangeable for one cent at the termination of the experiment. The last four shocks constituted an extinction period, during which reinforcement was withheld after shock.

For each of the three experimental groups, there were two control groups of five *S*s each. One such control served to determine the effect of the light onsets. These *S*s received the same number and patterning of light onsets after shock as the R *S*s, but such onsets were not exchangeable for monetary reward (Light-Controls, L-C). The second set of control groups served to determine the role of repeated shock on GSR activity (Habituation, H). These *S*s simply received a series of 16 shocks with no subsequent reinforcement.

Two additional control groups were included in the experiment, both receiving shocks at the medium shock-intensity level and consisting of five *S*s each. One such group (Money-Controls, M-C) received the same treatment as the medium shock-intensity R group, except they were paid the average sum earned by the R group before the experiment began. This group was included to control for any "arousal" effects which may occur upon the receipt of reinforcement for the R *S*s and which may distinguish them from their L-C counterparts.

The final control group (Light-Reinforcement Control, L-R Control) was included to determine the effects of skeletal and respiratory events on GSR conditioning. These *S*s were exposed to the same treatment as the R *S*s in the medium shock-intensity group, except that reinforcement was simply discontinued after shock whenever *E* observed any marked increase in EMG or respiratory activity.

Data analysis was restricted to the first, sixth, and twelfth trial of acquisition and the last trial of extinction (shock 16). These particular acquisition trials were chosen to obtain samples of each phase of the acquisition process. The decision to sample these trials was made previous to the experiment and does not represent an *a posteriori* decision.

4. *Procedure*

*S*s were seated and electrodes were attached. *S*s in the R and L-R groups were read the following instructions:

> In this experiment, I will be recording some physiological measures, including your galvanic skin response, respiration, and muscle activity. All you have to do is sit in this comfortable chair and relax. Try to keep your movements to a minimum, but don't fall asleep. You will receive electric shocks periodically.
>
> In addition, it is possible for you to earn some money. Each time this red light goes on, you have earned one cent. It is possible at this rate to earn up to $5.76. Any questions?

*S*s in the H groups were read the first paragraph of the above. *S*s in the L-C and Money-Control groups were also read the first paragraph of the above, with the following inserted as a second paragraph:

> During the experiment, the red light in front of you will occasionally go on. However, it has no meaning for you and may be disregarded. (If *S* suspected deception or pressed *E* on this point, it was explained that he was part of a control group.)

Shock-intensity determinations were then made. A variable rheostat was adjusted upward in five volt steps until *S* reported threshold and pain intensities. The rheostat was set at the appropriate intensity for a given *S* for the duration of the experiment. The lights were then dimmed and the white noise turned on. Calibration and adjustment of the sensitivity of the physiological variables then ensued. Inclusive of the calibration, a 20-minute period was allowed to elapse to insure a similar adaptation period for each *S*.

The experimental procedure then began. Twelve acquisition trials were followed by four extinction trials, all trials characterized by a four-minute intertrial interval. A response was considered as having occurred when, after shock delivery, GSR amplitude was above its preshock amplitude for a five-second period. Each such response was reinforced (by light onset) during acquisition, while this contingency was withheld during extinction.

At the termination of the experimental procedure, a response-contingency questionnaire was administered. In order to minimize cues in the questions, they became progressively more specific in pointing to the reinforcement contingency and were on separate pages. These questions were (*a*) What happened in this experiment? (*b*) What made the light go on? (*c*) Was there anything you could do to make the light go on?

C. RESULTS

1. *Preliminary Operations*

Analyses of variance were conducted on GSR amplitude for the first trial of acquisition within each shock-intensity level. None of these analyses proved significant, indicating that differential GSR responding could not be attributed to initial amplitude differences.

A statistical correction was applied to GSR slope to insure that return to preshock baseline could not be attributed to group differences in slope characteristics.[1]

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[1] A description of the slope correction procedure has been deposited with the National Auxiliary Publications Service. Order Document No. 00686 from ASIS National Auxiliary Publications Service, c/o CCM Information Sciences, Inc., 22 West 34th Street, New York, New York 10001; remitting $1.00 for microfiche or $3.00 for photocopies.

2. *Quantification*

A GSR was defined as occurring when amplitude was above its preshock level for a five-second period. In order to provide the greatest resolution of the skeletal events, different time periods were used in the analysis of each variable. Respiration rate was measured in 30-second periods, and consisted of the number of inspiration-expiration occurrences in that interval. Respiration amplitude and EMG amplitude were measured in 15-second periods and consisted of the single greatest amplitude for each measure occurring in that time span.

The postshock period was designated as consisting of three minutes, as this seemed to capture virtually all of the changes in skeletal activity occurring on each trial. The remaining one minute of the intertrial interval was considered as the preshock period for the next trial. Since interest was focused upon changes in skeletal activity in the postshock period, difference scores (mean postshock minus mean preshock rate or amplitude) were utilized expressed in centimeters (cm) pen deflection. Thus, in the graphic presentations, a negative number indicates that the variable decreased, a positive number that it increased in the postshock period.

3. *Substantive Results*

Figure 1 presents the GSR data for each shock-intensity level, as well as a combined level graph (all *S*s). The pronounced difference in response frequency between groups is statistically reliable in a Groups × (shock intensity) Levels × Trials analysis of variance ($F = 14.59$, $df = 2/32$, $p < .01$). Direct comparison of the R groups relative to the two sets of control groups (H and L-C) by orthogonal contrast indicated differential response frequency for this group ($F = 13.5$, $df = 1/32$, $p < .01$). The above analysis of variance also indicated differential GSR frequency as a function of shock-intensity level ($F = 18.60$, $df = 2/32$, $p < .01$). Orthogonal comparisons of these data indicated significantly less GSR activity in the threshold groups relative to the medium intensity groups ($F = 26.6$, $df = 1/72$, $p < .01$), and that the pain groups responded significantly more than both the medium and threshold groups ($F = 4.33$, $df = 1/72$, $p < .05$).

Additional analyses of the GSR data were carried out to determine effects within shock-intensity levels. Separate Groups × Trials analyses were computed for the pain, medium, and threshold shock-intensity levels. Results indicated significant group differences in the pain shock-intensity groups ($F =$

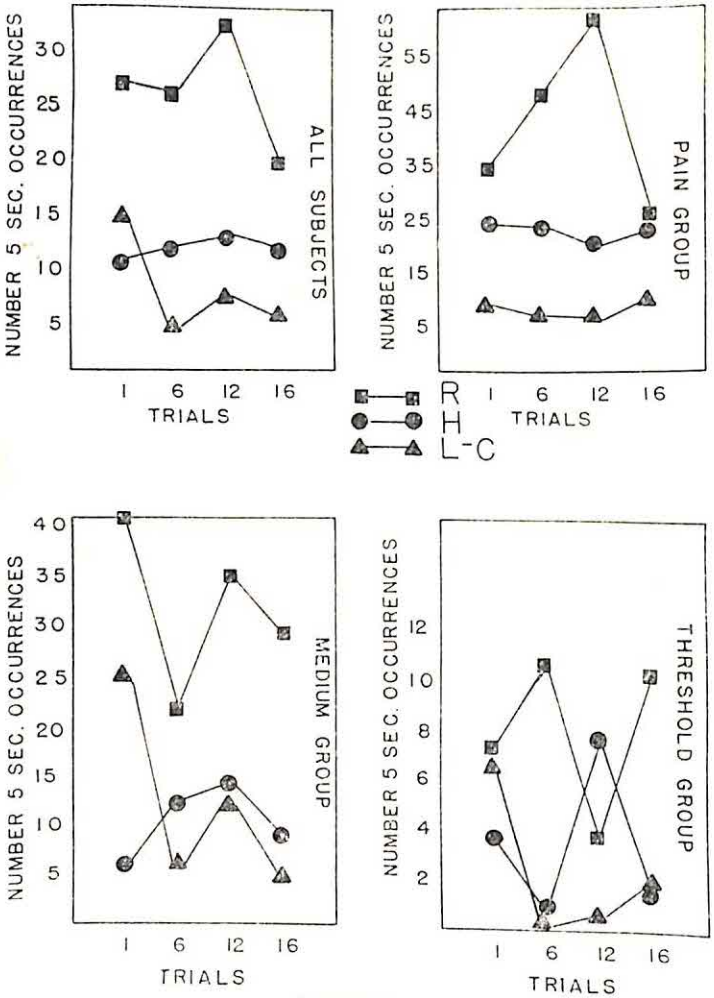

FIGURE 1
GSR Response Frequency as a Function of Trials

6.98, *df* = 2/12, $p < .01$) and in the medium shock-intensity groups ($F =$ 9.10, *df* = 2/12, $p < .01$). However, no significance was found between groups at the threshold shock-intensity ($F = .88$, *df* = 1/12, $p > .05$).

A Groups × Levels analysis of variance was conducted on GSR frequency during extinction. A significant difference was found between the groups ($F = 4.51$, *df* = 2/36, $p < .05$). Orthogonal contrast indicated that the R group was significantly higher in GSR frequency than the H and L-C groups ($F = 7.64$, *df* = 1/36, $p < .01$).

The final analysis of the GSR data concerned the additional control groups utilized in the experiment. Since both these additional groups (L-R-Control and M-C) had received shocks at the medium shock-intensity level, a Groups × Trials analysis of variance was run on all medium shock-intensity groups for the acquisition trials sampled. Results indicated significant differences between groups ($F = 6.39$, $df = 4/20$, $p < .01$). Dunnett's t test was used to probe the source of this difference, and indicated that the R group was statistically differentiated from all control groups at the .05 level. This indicates that the conditioning obtained in the R group was not due to arousal from the receipt of money (Money-Controls), an effect of repeated shock (H), or the effects of the light which indicated reinforcement (L-C). It does suggest, however, that skeletal events contributed to the successful conditioning as the L-R-Control group was significantly lower in GSR frequency than the R group. The L-R-Control group, it will be recalled, was subject to reinforcement withdrawal when *E* observed marked increase in skeletal activity.

4. *Skeletal Events*

No significant differences emerged for the EMG data.

The combined shock-intensity levels data for respiration amplitude are presented in Figure 2. A Groups × Levels × Trials analysis of variance indicated significant amplitude changes over trials ($F = 3.56$, $df = 2/72$, $p < .05$). The R group was statistically differentiated from its two controls at the .08 level ($F = 3.23$, $df = 1/32$) by orthogonal comparison. Analyses of variance for each of the shock-intensity levels failed to achieve significance.

The combined-level data for respiration rate are presented in Figure 3. Significant results were not obtained in a Groups × Levels × Trials analysis of variance although the R groups were marginally differentiated from the control groups in orthogonal contrast ($F = 3.29$, $df = 1/32$, $p = .08$). When these data were broken down by shock-intensity level, a significant Groups × Trials interaction was obtained for the pain shock-intensity group. Inspection of these data indicated that the R group decreased in respiration rate over trials, the L-C group increased, while the H *S*s showed little change.

5. *Questionnaire Data*

Since the R groups differed from the L-C groups only in the contingent relationship of light onsets and monetary reinforcement, responses to the questionnaire were compared between these two groups. These data indicated that at the third question, six R *S*s and one L-C *S* verbalized a skeletal re-

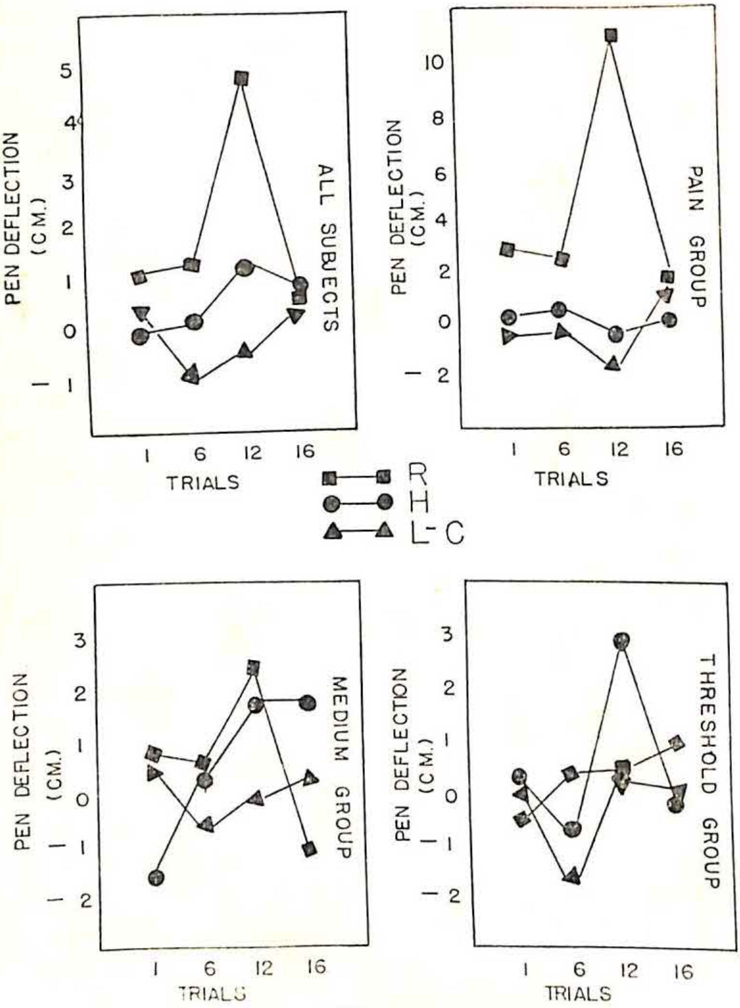

FIGURE 2

Difference Scores for Respiration Amplitude as a Function of Trials

sponse as being the reinforcement contingency. Many responses appeared to have been conditioned on a superstitious basis. For example, one *S* stated the contingency as "a deep breath followed by tapping the fingers of the right hand." Further, the frequency of implicating skeletal events was related to the shock-intensity group. For the R groups, 60 percent of the pain-intensity, 40 percent of the medium-intensity, and 20 percent of the threshold-intensity *S*s verbalized a skeletal response contingency.

The final analysis of the data was carried out on spontaneous fluctuations

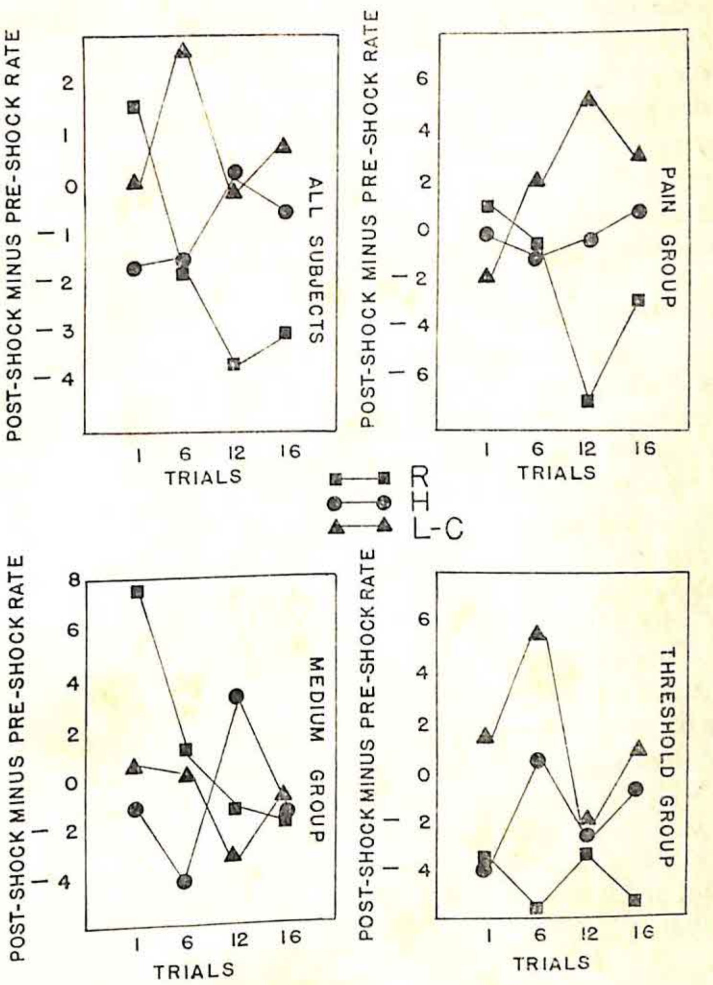

FIGURE 3

Difference Scores for Respiration Rate as a Function of Trials

(SFs) in skin conductance. Such SFs accounted in large measure for rate of return of GSR to postshock baseline and were clearly affecting the outcome of the experiment. Further, it appeared that SFs were associated with increased skeletal activity.

Procedurally, 10 records were chosen at random and a maximum of 10 SFs per record were tabulated resulting in 77 SF occurrences. SFs were tabulated only if they occurred one minute or more before or after a shock delivery and in the absence of light onsets. For each such observed SF, all skeletal activity occurring five seconds before and five seconds after its occurrence was measured. This interval was designated the critical interval. Further, a 10-second period either preceding or following the critical interval, and characterized by the absence of SFs was compared in skeletal activity (control interval). Biserial correlations of these data—increasing *vs.* decreasing skin conductance correlated with peak amplitude (for EMG and respiration amplitude)—or average rate—for respiration rate—were then computed. These produced correlations of +.42 for respiration amplitude, —.27 for respiration rate, and +.23 for EMG amplitude.

These correlations appeared surprisingly low upon inspection of the raw data. One possible reason for this was that a curvilinear, rather than rectilinear relationship existed between these variables. A second possibility was that each such correlation utilized only the information from a single skeletal variable. Accordingly, these data were analyzed by a different method.

This second analysis utilized the data from all 55 *S*s. It may be noted that an equal probability exists for any of four skeletal events being associated with increased skin conductance. That is, the skeletal variable of highest amplitude associated with an SF could be either (*a*) EMG control (*b*) EMG critical (*c*) respiration control (*d*) respiration critical. Thus, the probability of the critical interval being highest in skeletal activity for a given SF is 2/4 or 1/2. From the 55 polygraph records, 398 SF instances were found using the same rules as discussed above. Of these, 269 were associated with the critical interval, 129 with the control interval. These data were subjected to chi-square analysis, with theoretical frequencies based on the assumption of equal probabilities for each event. This analysis proved significant ($\chi^2 = 49.24$, $df = 1$, $p < .001$), and it was concluded that SFs are associated with increased skeletal activity.

D. DISCUSSION

The results of this study are clearly in agreement with several recent publications which have demonstrated that autonomic activity can be brought under instrumental control (1, 5). First, the reinforced *S*s were significantly distinguished from all control groups in terms of GSR response frequency. Second, the acquisition functions showed increased response frequency over trials. This was most pronounced in the pain shock-intensity group which takes the form of a linear monotonic function. Third, during extinction those groups which conditioned showed decreased response frequency.

An additional finding is that conditioning is facilitated under conditions where large increases in skin conductance are associated with reinforcement. Thus, successful conditioning was not obtained in a group (threshold) where skin conductance changes were minimal, while successful conditioning was obtained in groups characterized by greater skin conductance change.

One interpretation of these data would suggest that greater afferent feedback characterized those groups in which successful conditioning occurred. Such an interpretation, emphasizing increased discriminability in autonomic process, is consistent with recent anatomical advances. Thus, Lacey (7) has emphasized that the autonomic system possesses afferent, in addition to efferent, properties.

There is, however, an alternative interpretation of the obtained results. This interpretation suggests that autonomic conditioning is either secondarily induced or correlated with skeletal changes. Several studies exist which have emphasized the interrelationship of autonomic and skeletal activity (2, 12).

There are in the present study several lines of evidence which support this latter interpretation of the data. First of all, *S*s who were not reinforced when skeletal activity was observed (L-R-Controls) failed to show evidence of conditioning. Secondly, there is some evidence that *S*s altered respiratory activity after shock. Reinforcement *S*s displayed both an increased amplitude and a decreased respiratory rate after shock: a pattern consistent with deep breathing. Finally, *S*s reported by questionnaire that skeletal events were the contingent responses. It should be noted that questionnaire data probably underestimate actual skeletal activity, as alterations in skeletal activity have been demonstrated in the absence of verbal reports of such alteration (4).

One finding thought to be of considerable import was the association of SFs with increased skeletal activity. This result achieves its importance in consideration of the fact that virtually every study of instrumental GSR conditioning has used SFs as the response measure.

Several methodological implications arise from the present study. Most obviously, it suggests that respiration and EMG measures should be obtained when GSR conditioning studies are attempted. Second, it suggests that different types of data analysis are demanded by this type of study. Adequate conditions for GSR include central events, altered respiratory activity, and altered EMG activity. Thus, what appears phenotypically as a GSR change may reflect genotypically different sources. In the data analysis, however, GSR deflections are pooled irrespective of their source. Genotypical events, however, are subject to individual analysis. If EMG and respiratory activity are conditioned on a superstitious basis, different *S*s will presumably utilize different "strategies" to obtain reinforcement. This may have the effect of masking the acquisition of skeletal events when means are computed for each such event.

There is some danger in generalization of the present results to previous studies. For example, shock was used here in contrast to the vast majority of previous studies. Conceivably, shock might have increased *S*s' movements or produced unconditioned respiratory activity, making skeletal conditioning more likely. Moreover, there is little reason to assume that results from one autonomic variable are necessarily generalizable to other autonomic events. Relevant to this line of reasoning are the typically low intercorrelations in autonomic activity (8, 9), and the differential innervation of various autonomic events. Thus, the GSR is controlled solely by the sympathetic, heart rate controlled by both sympathetic and parasympathetic innervation.

REFERENCES

1. BRENER, J. Heart rate as an avoidance response. *Psychol. Rec.*, 1966, **16**, 329-336.
2. GELLHORN, E. Principles of Autonomic-Somatic Integration. Minneapolis: Univ. Minnesota Press, 1967.
3. HARWOOD, C. W. Operant heart rate conditioning. *Psychol. Rec.*, 1962, **12**, 279-284.
4. HEFFERLINE, R. F. Learning theory and clinical psychology—An eventual symbiosis? In Bachrach, A. J., *Experimental Foundations of Clinical Psychology.* New York: Basic Books, 1962.
5. KIMMEL, H. D. Instrumental autonomic conditioning. *Psychol. Bull.*, 1967, **5**, 337-345.
6. KONORSKI, J., & MILLER, S. On two types of conditioned reflex. *J. Genet. Psychol.*, 1937, **16**, 264-272.
7. LACEY, J. I., & LACEY, B. C. The relationship of resting autonomic activity to motor impulsivity in the brain and human behavior. *Proceedings of the Association for Research in Nervous and Mental Disease* (*Vol. XXXVI*). Baltimore, Md.: Williams & Wilkins, 1958.
8. LAZARUS, R. S. Psychological Stress and the Coping Process. New York: McGraw-Hill, 1966.
9. MARTIN, B. The assessment of anxiety by physiological behavioral measures. *Psychol. Bull.*, 1961, **58**, 234-255.
10. MARTIN, I. Somatic reactivity. In Eysenck, H. J. (Ed.), *Handbook of Abnormal Psychology.* New York: Basic Books, 1962.
11. MOWRER, O. H. Preparatory set (expectancy): A determinant in motivation and learning. *Psychol. Rev.*, 1938, **45**, 62-92.
12. OBRIST, P. A. Heart rate and somatic-motor coupling during classical aversive conditioning in humans. *J. Exper. Psychol.*, 1968, **77**, 180-193.
13. SKINNER, B. F. The Behavior of Organisms: An Experimental Analysis. New York: Appleton-Century, 1938.

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THE EFFECT OF SUBJECTS' CONFORMING TO MNEMONIC INSTRUCTIONS*[1]

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A. INTRODUCTION

Research on mnemonics prior to Wood's publication (11) was somewhat restricted to rather obscure journals (e.g., 1, 7, 10). The sole article (9) which received wide acceptance reported generally negative results, indicating that the commercial mnemonics techniques were possibly not as effective as the authors of the texts presumed.

Wood (11), on the other hand, did present generally positive results in favor of mnemonics, but was still hesitant in his recommendation for acceptance. Other recent research (2, 4, 5, 8) has indicated support for the use of mnemonics as an aid to rote learning.

The purpose of the present paper is to suggest possible reasons for previous negative results (e.g., 9) with mnemonics and to present a possible aid for further research.

It is the present authors' belief that association of mnemonics with commercialism, even stage magic, suppressed much interest in controlled research in the area. A second reason for lack of interest might have been the inability of researchers [as was the case with Smith and Noble (9)] to find positive results with the use of mnemonics techniques. In relation to the latter, the present authors consider the *S*'s attention to mnemonic instructions an important factor. Even those studies which have yielded positive results have, for the most part, not indicated the importance of the *S*'s obeying the mnemonics instructions. Only Delin (2) has attended to this aspect of the research.

The present study began as an investigation of a particular mnemonic system, the "hook" or "peg" system, similar to that presented in Furst (3) and Roth (6), as presented in a self-instructional text. The general purpose was to determine the effectiveness of the system when *S*s used it in the per-

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[1] This study represents a portion of the effort carried out under Air Force Contract F33615-67-C-1469.

formance of several memory tasks. Due to a *posthoc* decision on the part of the senior author, the study had included in it a crude measure of the degree to which *S*s conformed to their mnemonic instructions.

The present report is an attempt to point out an important relationship between the degree to which *S*s actually employ the mnemonic techniques in which they are instructed and the level of performance ultimately exhibited on a criterion learning task.

B. METHOD

The 39 *S*s were enlisted Air Force personnel awaiting technical training at Chanute Air Force Base, Illinois. The *S*s were randomly assigned to one of three experimental groups designated as *C* (controls), in which the *S*s received no instruction in memorization techniques but were given two forms of a memory test; E_1 (experimental one-test), in which the *S*s were first trained by reading a self-instructional text and observing a demonstration in the use of a mnemonic technique and then given a memory test; E_2 (experimental two-tests), in which the *S*s were first pretested with one form of a memory test, then instructed in the use of mnemonics, and finally retested with an alternate form of a memory test.

The training consisted primarily of reading a self-instructional text in mnemonics prepared by the authors, which presented the basis of the "hook" system (3, 6). Also included in training was a demonstration and introductory lecture by *E*. The memory test consisted of three selections: (*a*) 25 paired associate nouns; (*b*) three serial lists of 25 words each which were consecutively presented before testing any list; and (*c*) a serial list of 25 two-digit numbers.

The experiment was divided into three phases. The first phase involved the pretesting of the *C* and E_2 groups. The second phase consisted of the lecture demonstration and training of E_1 and E_2 *S*s, with the approximate mean reading time being five hours. The experimental text was divided into five chapters, with a separate booklet for each chapter. During the reading periods *E* was available for explanation and elucidation of the reading material. The reading phase was divided into five, two-hour sessions with all *S*s required to remain in the experimental room until every *S* completed the assigned reading for the session. The third phase of the experiment was the final testing session during which groups E_2 and *C* were given the alternate form of the memory test and group E_1 *S*s received their first and only exposure to the test. After all testing was completed, *E* asked the *S*s who were trained in mnemonics to write a brief statement attesting "truthfully" whether or not they actually used the system as presented in the text and lecture.

C. Results

The data were taken to be the number of correct responses in the correct position for the total test (maximum possible score 125). There were no penalties for misspelling as long as the word was easily discriminable. No credit was given for homonyms or synonyms.

In order to control for test effects, the C and E_2 groups were compared for their second exposure to the memory test (posttraining for E_2) and the E_1 group scores were compared with scores for the first exposure to the test of group C. Also, difference scores, to indicate improvement, were analyzed for the groups which had two tests.

In order to determine group equality prior to training, the pretest scores on the memory test were compared for groups C and E_2. This comparison yielded a $t = 1.74$ ($df = 37$, n.s.). To determine the effects of training, posttest scores from groups E_2 and C were compared and yielded a $t = .81$ ($df = 37$, n.s.). A t test for paired samples was calculated ($t = 5.30$, $df = 18$, $p < .01$) as a comparison of pre- and posttest scores for group C to determine the effects due to testing alone. A comparison of C pretest and E_1 posttest yielded a $t = 2.80$ ($df = 37$, $p < .01$) which is indicative of the effects of training alone. (See Table 1.)

The above statistics were carried out with the use of the data from *all* Ss without consideration of the possible differences within the E_1 and E_2 groups, attributable to whether the various Ss really employed the mnemonic techniques in which they were instructed. These results will be referred to as Phase I statistics. The data were subjected to an additional set of statistical analyses (Phase II statistics) in which each S was identified as a "User" or

TABLE 1
Mean Memory Test Scores

	Experimental group		
Phase	C	E_2	E_1
I.			
Pretest $\overline{X}$	36.74	31.45	—
Posttest $\overline{X}$	51.95	47.75	53.85
II.			
Posttest users $\overline{X}$	—	55.08	63.60
Posttest nonusers $\overline{X}$	—	34.14	44.10

"Nonuser" of mnemonics according to the verbal reports solicited after testing.

A $2(E_1$ *vs.* $E_2) \times 2$(Users *vs.* Nonusers) analysis of variance (using posttraining scores for E_2 *S*s) resulted in an $F = 10.90$ ($df = 1/36$, $p < .01$) for the Users-Nonusers dimension with the Users ($\overline{X} = 58.78$) exhibiting performance significantly superior to the Nonusers ($\overline{X} = 40.00$). The interaction of treatment and Users-Nonusers yielded an $F = .01$ ($df = 1/36$, n.s.). This finding led to a reanalysis of the earlier data separating the trained groups along the Users-Nonusers dimension.

An analysis of variance comparing posttest scores for groups *C*, E_2 Users, and E_2 Nonusers resulted in an $F = 5.02$ ($df = 2/36$, $p < .01$) with the E_2 Nonusers ($\overline{X} = 34.14$) exhibiting performance inferior not only to E_2 Users ($\overline{X} = 55.08$) group, but also inferior to C group *S*s ($\overline{X} = 51.95$) who had had no mnemonics training at all. These same groups were also compared for amount of change between first and second testing scores. The results were comparable to the previous analysis ($F = 4.33$, $df = 2/36$, $p < .05$) except that only the E_2 *Users* ($\overline{X} = 32.46$) showed a significant improvement score when compared with the E_2 Nonusers ($\overline{X} = 14.86$), the *C* group ($\overline{X} = 25.21$) was not statistically different from either of the groups.

When comparing groups *C* pre, E_1 Users post, and E_1 Nonusers post to determine the effects of training, an analysis of variance yielded an $F = 7.40$ ($df = 2/36$, $p < .01$) with the E_1 Users ($\overline{X} = 63.6$) exhibiting performance superior to both groups *C* ($\overline{X} = 36.7$) and E_1 Nonusers ($\overline{X} = 44.1$).

D. Discussion

The results of the present study seem to indicate the importance of the subjects' reported use of the mnemonic system. The Phase I statistics are not unlike the results of some previous studies in the authors' laboratory, and possibly are similar to the results of other investigators (e.g., 9). The inability to obtain significant differences after training might, quite reasonably, lead one to discount the claims of the commercial mnemonists or any other person supporting the use of mnemonics.

But, if one examines the Phase II statistics, which regard the *S*'s confirmation or denial of using mnemonics (Users *vs.* Nonusers) it can be seen that the scores of the Nonusers are significantly lower than the scores of the *Users* (which is to be expected), and in some cases *even lower* than the scores of the *untrained* *S*s. The inclusion of these *S*s in a typical mnemonic study as part of the trained group would tend to decrease the average effects of training. This being the case, studies in the past which have not shown significant *average* training effects might have been confounded by this factor.

Though no objective data were collected to determine the reason for this phenomenon, a few rather subjective statements from some of the subjects and some intuitive judgments on the part of the experimenters seem appropriate at least as an attempted partial explanation. A number of *S*s approached the experimenter at the conclusion of the study and voluntarily submitted that they did not use the system simply because they had not had enough practice and were unsure of themselves. Some stated that they got "mixed up" after starting the test with the use of mnemonics and had to revert to their old methods. Some stated they did not understand the system and were not convinced that it would work.

It can be readily seen that *S*s who *attempt* to use a mnemonic system which they have not mastered completely, and who, therefore, have to change learning strategies in the middle of performing their criterion test, might well exhibit depressed performance scores. The inclusion of such *S*s, mixed indiscriminately with *S*s who profitably use their mnemonic system (hence, show higher performance scores), can produce scores which *on the average* do not differ from memory scores produced by *untrained* *S*s. Apparently some *S*s are aided by mnemonics (as claimed by mnemonic promoters) but the performance of other *S*s is apparently *depressed* by exposure to mnemonic training. The difference between the performance of these two subsets of "trained" *S*s seems to be due, at least in part, to the *S*'s degree of mastery of the technique, his facility with the technique, and/or his motivation to persist in trying to use the technique.

In conclusion, it is the present authors' belief that the study, as reported, has demonstrated the importance and necessity of *S*s, in mnemonics study, conforming to instructions. If this is not possible, then it is suggested that the data be analyzed in such a way as to be able to remove the confounding factor along the Users-Nonusers dimension. It is apparent that knowledge of, and practice with, a mnemonic system is not, in itself, sufficient to produce improvement in learning performance scores; researchers should avail themselves of some assurance that *S*s actually employ the mnemonic system in which they have been trained. From the data reported here, it would appear that failure to assure that *S*s are actually sufficiently adept in the use of mnemonics to apply them can result in conditions which actually depress, for some *S*s, learning performance below the level exhibited by untrained control *S*s.

E. SUMMARY

The present study was an attempt to establish an explanation for the failure of mnemonics research to support the use of mnemonics.

Three groups of *S*s were compared to determine the effects of mnemonic training in rote verbal learning. The results were not indicative of support for mnemonics. The same data were reanalyzed except that the trained groups were separated along a Users-Nonusers dimension in order to test for the effects of conforming to mnemonic instruction. These analyses resulted in support of mnemonics. The results demonstrated the importance and necessity of *S*s' conforming to mnemonic instructions in order to demonstrate the effectiveness of mnemonics.

REFERENCES

1. BALABAN, A. Uber den Unterschied des logischen and mechanischen Gedachtnisses. *Z. Psychol.*, 1910, **56**, 356-377.
2. DELIN, P. S. Success in recall as a function of success implementation of mnemonic instructions. *Psychon. Sci.*, 1968, **12**, 153-154.
3. FURST, B. Stop Forgetting. New York: Greenburg, 1949.
4. PERSENSKY, J. J., & SENTER, R. J. An experimental investigation of a mnemonic system in recall. *Psychol. Rec.*, 1969, in press.
5. ROSS, J., & LAWRENCE, K. Some observations on memory artifice. *Psychon. Sci.*, 1968, **13**, 107-108.
6. ROTH, D. M. Roth Memory Course. Santa Monica, Calif.: Motivation, 1961.
7. SENTER, R. J. Review of Mnemonics and Mnemonotechnics for Improved Memory. Wright Patterson Air Force Base, Ohio: Aerospace Medical Research Laboratories, 1965 (AMRL-TR-65-180).
8. SENTER, R. J., & HAUSER, G. K. An experimental study of a mnemonic system. *Psychon. Sci.*, 1968, **10**, 289-290.
9. SMITH, R., & NOBLE, C. E. Effects of a mnemonic technique applied to verbal learning and memory. *Percept. & Motor Skills*, 1965, **21**, 123-134.
10. WALLACE, W. H., TURNER, S. H., & PERKINS, C. C. Preliminary studies of human information storage. Signal Corps Project No. 1320, Institute for Cooperative Research, University of Pennsylvania, Philadelphia, 1957.
11. WOOD, G. Mnemonic systems in recall. *J. Educ. Psychol. Monog.*, 1967, **58**.

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RELATIONSHIP OF JUDGED COMPLEXITY TO CHANGES IN MODE OF PRESENTATION OF OBJECT SHAPES*

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A. INTRODUCTION

Perceived complexity has continually turned out to be one of the more elusive aspects of perceptual experience. Bergman and Spence (5) specified a psychological attribute, not as a property of physical objects or events, but defined by means of discriminatory objects or events on the part of observers who are different from the experimenter. For Berlyne (6), perceived complexity as applied to visual stimulus patterns increases with the number of distinguishable elements, with the dissimilarity between the elements, and with the degree to which several elements are responded to as a unit. Dember (7) contends that the psychological basis for complexity is related to the fact that some stimuli contain more information than others and thus afford the perceiving organism more potential opportunity for responding. Attneave (2) argues that the judged complexity (of shapes) may or may not vary with their information content, depending on the ways in which information is varied.

Attneave and Arnoult (4), using quantitative methods for shape and pattern construction, devised a series of methods whereby randomly derived samples of geometrical shapes could be constructed from specifiable stimulus-domains; stimuli so derived are designated "nonsense" shapes. They could quantitatively describe visual shapes and patterns, used as independent variables, to study the relationship between constructed stimulus complexity and perceived complexity.

Their technique allows for the delineation of variations in stimulus complexity within the context of an analytically descriptive system. Several studies have been directed toward a determination of the relationship between stimulus complexity, as determined by the methods of Attneave and Arnoult, and perceived complexity. In a study by Attneave (2) it was found that

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judged complexity increases logarithmically with the number of sides of a polygon, and that most of the variance in complexity judgments (.90) could be accounted for by a few physical parameters (number of turns, the square of the perimeter divided by the area, etc.).

Arnoult (1) determined that the majority of the variance associated with judgments of complexity could be accounted for on the basis of the physical characteristics of the stimuli.

Goldstein (8) however, insisted that figural complexity is *not* solely determined by the physical parameters of the stimulus configuration. He felt that an inverse relationship exists between the apparent complexity of randomly-derived visual stimuli and subjects' familiarity with them. His *S*s found familiar shapes significantly less complex than unfamiliar shapes. Vanderplas and Garvin (10) extracted three factors from response data of their study: (*a*) association value, (*b*) specific association (content value), and (*c*) information per content response (heterogeneity index). Association value to the figure ranged from 20 to 62 percent. Stimulus complexity varied inversely with the number, content, and heterogeneity of associative responses. Attneave (3) points out: "*S* need not perceive objects in accordance with the *E*'s descriptive system: from *S*'s descriptions we acquire new knowledge about the nature of the perceptual process."

Experiments thus far reported stressed predictions involving either (*a*) relationship between stimulus complexity and perceived complexity or (*b*) tendency of *S* to select one level of stimulus complexity over another (as inferred from the pattern of the organism's attention, exploration, etc.).

From findings in other areas of research we infer that additional variables influencing perceived complexity should be able to be identified.

Nash (9) reports an experiment in which adaptation level for several series of weights (based on magnitudes) was raised markedly by the addition of a "heavy background" weight. The perceived complexity of a visual stimulus might likewise be altered by the addition of a stimulus which differed in complexity from those in the original set of stimuli.

We carried out our experiment to try to find the effect of human judgments of stimulus complexity which result from experimentally induced changes in the presentation of a set of randomly derived stimulus shapes.

Under conditions such that two levels of stimulus complexity of randomly derived shapes were presented, we hypothesized that the median judged complexity of the two levels would be significantly different from the median judged complexity of the same levels when a third level of stimulus complexity was used.

B. METHOD

One hundred twenty undergraduate students at California State College at Los Angeles, enrolled in courses in psychology or educational psychology, were divided equally into experimental and control groups. Experimental *S*s worked with three, control *S*s with two levels of complexity. Experimental and control groups were further divided into six subgroups, making six experimental variations for each. Each experimental variation represented one of the six complexity level variations (i.e., 1-2, 1-3, 1-4, 2-4, and 3-4).

Thirty-six "nonsense shapes" (after Method I, Attneave and Arnoult, 1956) were derived. An equal number of stimulus shapes were constructed on four levels of complexity, as determined by the number of perimeter points in each shape. Level 1 had six; level 2, 12; level 3, 18; and level 4, 24 perimeter points. Shapes, made of black material against a white background, processed as 35 mm slides were tachistoscopically presented.

Each experimental *S* was exposed to a series of five shapes representing one of 12 stimulus sets—each stimulus set included three levels of complexity. For control *S*s the identical procedure was used except with two levels.

The first stimulus in each set was presented as a sample or anchor stimulus; responses for this were not recorded. Response latency of all stimulus shapes was fixed at .5 seconds.

*S*s were provided with four response sheets, one for each of four stimulus shapes in each stimulus set. Each sheet included a rating scale with nine categories of response. Extremes of the scale were anchored by the instructions given to subjects: scale response 1 was perceived as "very simple," 9 perceived as "very complex."

C. RESULTS

A median test was performed for each of the six experimental variations. From Table 1, it can be seen that three—1, 3, and 5—variations showed a statistically significant difference between experimental and control groups.

On the basis of the results obtained from the initial nonparametric median tests, an analysis of variance test was performed on each of the six experimental variations. A four by four matrix was constructed for each of the experimental variations and a series of analysis of variance tests were designed to analyze the sources of variation associated with (*a*) the complexity levels of the sample or anchor stimuli, (*b*) the complexity levels of the response trials, and (*c*) the interaction between the complexity levels of the sample stimuli and the response trials for each experimental variation.

Table 2 presents a summary of results on the six experimental variations

TABLE 1
MEDIAN TEST:* BETWEEN EXPERIMENTAL AND CONTROL GROUPS

Experimental variation	Order of complexity levels	Median response	Proportion table between groups			Results
1	1-2-2-1	4.5		Control	Exp.	$p < .025$
			+	7	2	
			—	3	8	
2	1-3-3-1	4.375		Control	Exp.	NS (at .05)
			+	7	3	
			—	3	7	
3	1-4-4-1	4.25		Control	Exp.	$p < .025$
			+	8	2	
			—	2	8	
4	2-3-3-2	5.125		Control	Exp.	NS (at .05)
			+	4	6	
			—	6	4	
5	2-4-4-2	4.875		Control	Exp.	$p < .025$
			+	2	8	
			—	8	2	
6	3-4-4-3	5.25		Control	Exp.	NS (at .05)
			+	4	6	
			—	6	4	

* These results, derived by using the Fisher Exact Probability Test show in which of six variations experimental and control *S*s differ significantly in the proportion in which they fall into two levels of classification.

tested. Of the six variations analyzed, two (variations 1 and 3) showed a significant difference in subject responses among the four levels of complexity associated with the presentation of sample stimuli, where data relating to each complexity level were analyzed separately.

These results demonstrate a significant difference in subject responses between each of the levels of complexity associated with the experimental trials, with the sixth variation a nonsignificant exception. Concerning sample complexity and trial complexity interaction, only one experimental variation (variation 2) yielded results.

D. DISCUSSION

Results are built upon analysis of data divided into three basic data groupings. For the median tests (Table 1) data were grouped so as to make comparisons between experimental and control *S*s in six experimental variations. The hypothesis was supported in three instances. Those results which show a significant difference between experimental and control groups support the concept that judged complexity of shapes, presented in situations incorporating

TABLE 2
ANALYSIS OF VARIANCE SUMMARY: ALL EXPERIMENTAL VARIATIONS

Experimental variation	Complexity of sample	Complexity of trials	Interaction Trials and sample
1	$p < .01$	$p < .01$	NS
2	NS	$p < .01$	$p < .01$
3	$p < .01$	$p < .01$	NS
4	NS	$p < .01$	NS
5	NS	$p < .01$	NS
6	NS	NS	NS

Note: Results are shown of series of analysis of variance tests run on six experimental variations. Two (variations 1 and 2) show significant difference in *S* responses among four levels of complexity associated with the presentation of sample stimuli, where data relating to each complexity level were analyzed separately.

Results show a significant difference in *S* responses between each of the two levels of complexity associated with the experimental trials except for experimental variation 6 (concerning sample complexity and trial complexity interaction, only variation 2 gave significant results).

two complexity levels, is significantly different from judged complexity of the identical shapes presented in situations where three complexity levels were used.

The organization of data in the analysis of variance test series indicated that, for all but one of the experimental variations, judgments were in accordance with the constructed complexity levels assigned to the various stimulus shapes (Table 2). These findings confirm the relationship between stimulus complexity (as defined in terms of the stimulus parameters of the stimulus configuration: e.g., number of perimeter points) and judged complexity.

It is possible that there exist interactions between or among complexity levels, hard to define or isolate, but which may, under certain circumstances, function as a meaningful component in judging stimulus complexity.

The third primary grouping utilized the collective data of the study, and a multiple correlation and regression analysis was performed on the total array (of Table 3). The two best overall predictors of the judged complexity of shapes were (*a*) the constructed complexity of the sample shape and (*b*) the constructed complexity of the shape being judged. Additional information related to the complexity levels of preceding shapes in a stimulus set added little to ability to predict judgments of complexity.

E. CONCLUSIONS

Several tentative conclusions can be reached on the results of this study: judged complexity can be influenced by such factors as: (*a*) a change in the

TABLE 3
MULTIPLE CORRELATION ANALYSIS SUMMARY: ALL FIGURE RESPONSES

	Response			
Variable	Figure "A"	Figure "B"	Figure "C"	Figure "D"
Complexity—Sample = (S)	—.3012	—.3573	—.3071	—.9082
Complexity—Figure "A" = (A)	.5616	.0835	—.0571	.4523
(S) + (A)	.6373			
Complexity—Figure "B" = (B)		.0229	.1398	.0537
(S) + (A) + (B)		.3636		
(A) + (B)		.0863		
Complexity—Figure "C" = (C)			.1398	.0537
(S) + (A) + (B) + (C)			.3678	
(A) + (B) + (C)			.2026	
(B) + (C)			.1398	
Complexity—Figure "D" = (D)				.4523
(S) + (A) + (B) + (C) + (D)				.5038
(A) + (B) + (C) + (D)				.4941
(B) + (C) + (D)				.4941

number of complexity levels presented, (*b*) complexity of initial stimulus presented, (*c*) complexity level of stimulus being judged. Complexity level interaction may, under specific circumstances, function as an identifiable component in complexity judgments.

Perceived complexity, like other psychological attributes, is multidimensional and may thus be effected by several parameters in the experimental situation and/or the subject (i.e., association value, familiarity, etc.).

Psychological complexity should be viewed as a multidimensional concept consisting of several factors, where each factor represents some dimension of complexity, and, where each factor is subjectively weighed by the subject. In such a framework, each complexity judgment made by the subject would represent an aggregate of weighted factors. The results of this experiment indicate the existence of several such factors and suggest that these factors may be differentially weighted dependent upon (*a*) changes in the experimental situation and (*b*) subjective concepts and implicit expectations concerning complexity imposed by the subjects.

These factors may be of significance to a theory of stimulus complexity. Research which is addressed to the prediction of responses to differentially complex stimuli must make certain assumptions related to the characteristics of complexity as a psychological attribute. The degree of correspondence between complexity, as operationally defined, and complexity as perceived in an experimental situation must be evaluated, with the use of as many relevant factors as can be isolated and identified.

REFERENCES

1. ARNOULT, M. D. Prediction of perceptual responses from structural characteristics of the stimulus. *Percept. & Motor Skills*, 1960, **1**, 261-268.
2. ATTNEAVE, F. Physical determinants of the judged complexity of shapes. *J. Exper. Psychol.*, 1957, **53**, 221-227.
3. ———. Applications of Information Theory to Psychology. New York: Holt, 1959. Pp. 1-245.
4. ATTNEAVE, F., & ARNOULT, M. D. The quantitative study of shape and pattern perception. *Psychol. Bull.*, 1956, **53**, 452-471.
5. BERGMAN, P., & SPENCE, K. W. The logic of psychophysical measurement. *Psychol. Rev.*, 1944, **51**, 1-24.
6. BERLYNE, D. E. Conflict, Arousal and Curiosity. New York: McGraw-Hill, 1960. Pp. 1-356.
7. DEMBER, W. N. The Psychology of Perception. New York: Holt, 1960.
8. GOLDSTEIN, A. G. Familiarity and apparent complexity of random shapes. *J. Exper. Psychol.*, 1951, **62**, 591-594.
9. NASH, N. G. A quantitative study of effects of past experience on adaptation level. Unpublished Doctoral dissertation, Bryn Mawr College, Bryn Mawr, Pennsylvania, 1950.
10. VANDERPLAS, J. M., & GARVIN, E. A. The association value of random shapes. *J. Exper. Psychol.*, 1959, **57**, 147-154.

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THE EFFECT OF THREE TYPES OF VISUAL IRRELEVANCY ON COMPLEX DECISION MAKING*[1]

Educational Testing Service, New Jersey Urban Schools Development Council, and Drexel Institute of Technology

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A. INTRODUCTION

The term *irrelevant information* in the psychological literature refers to two quite separate sets of experimental manipulations. On the one hand, it has been used to refer to an asynchrony between training and criterion trials in concept identification tasks. Thus, *S* is trained on one stimulus dimension and later tested in a concept identification situation wherein the training dimension cannot be used to attain correct categorization. The other usage of the term derives from the use of additional stimuli in search-time discrimination tasks. In this type of task, *S* has to identify critical stimuli in a "noisy" field. These studies have derived their impetus from the problems faced by a radar operator on extended watches.

The results of almost all of the studies investigating the effects of irrelevancy as a training variable have suggested that the inclusion of such a variable at best does not affect performance. Thus, Archer (1) found that response time in a concept formation task increased as a linear function of the amount of relevant information, but was independent of the level of irrelevancy. Archer, Bourne, and Brown (2) found that as irrelevant elements were increased, efficiency of categorizing unusual patterns decreased even when *S*s were instructed how to test for irrelevancy. Henneman (9) and Morin, Forrin, and Archer (17) verified Archer's (1) study that irrelevancy does not significantly degrade performance. In addition, Henneman (9) found that making information sometimes irrelevant and sometimes relevant will

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degrade performance. Detambel and Stolurow (4) showed that lowering the conspicuity of irrelevant information interferes with the learning process. Namikas (18) also found that training on a relevant dimension improved performance in the concept formation transfer task. Interestingly enough, however, groups that were trained on irrelevant dimensions were not significantly different from those trained on neutral dimensions or those receiving no training. Katz (11) applied the concept learning paradigm to the developmental effect of irrelevant dimensions. She found that while a degradation occurred in adults as a function of the number of irrelevant cues, no such effect occurred in school grades 1-5. Evidently young children are able to ignore irrelevancy. These studies fall into the first category given above: namely, irrelevancy being defined as a difference between training and criterion task conditions.

Studies of the second type in which irrelevancy is defined by the number of additional stimuli in the field have usually found a degradation of performance when such operations are performed. An example is a study by Boynton (3). Here the *S* was required to determine if a given stimulus was present on a display to which were added varying numbers of other stimuli. Results indicated that the greater the number of irrelevant figures, the poorer the detection performance. Mayzner, Adler, Cohen, and Schoenberg (16) found no such effect. Using a short-term recall task, they found that level of performance was unrelated to the number of irrelevant stimuli in the field.

Of further interest is a study of Rappaport (19) in which he found that adding redundancy (repeating a visual pattern) degraded identification. When irrelevancy (defined as additional stimuli) was added, performance improved as a function of the level of redundancy.

If one focuses on the stimuli used in the studies described above, some information of interest to the present study can be extracted.

In the first place, one notes that in the irrelevant dimensions studies, the problem for *S* is a simple one, requiring a series of discrete two-choice decisions. Each decision does not directly affect the choices available on succeeding trials. One contrasts this situation with the type usually used in studies of complex problem-solving (e.g., 7, 10, 13, 20), in which each decision that *S* makes not only constrains succeeding decisions but also is a component of *S*'s problem solution. Such game-type situations have the prime advantage of environmental veridicality. One might plausibly wonder if the effects of irrelevant coding schemes found in the reviewed studies would hold up in such a complex situation. Landis, Slivka, Jones, and Silver (14) have noted that, in a search-time task, using a structured and meaningful field changed functional relationships among variables to such an extent as to restrict severely the generalizability of previously reported results.

The search-time studies, while they have utilized rather interesting sets of independent variables, have focused on questions of the accuracy of obtaining information rather than applying it in a complex problem-solving situation. Again, one can ask about the generalizability of these results to such situations.

To summarize, the present study is directed to providing information on the effect of both irrelevant coding schemes and stimuli on the adequacy of decision making.

B. Method and Procedure

1. *Subjects*

The subjects were 30 male college-age volunteers (Mdn age = 21) serving with pay. Each subject had normal color vision as measured by the Dvorine Pseudo-Isochromatic Plates, and 20/20 vision (with corrective lenses, if worn).

2. *Stimuli*

The stimuli were 36 chromatic map-plus-overlay displays each measuring 11 by 18 inches. Figure 1 presents a sample display.

Each stimulus consisted of a set of 20 cities, randomly placed on the map. Surrounding each city were symbols which carried information which would be used by *S* in the solution of the problem. The instructions and rules of the game[2] are given below and describe the situation for *S* in greater detail.

3. *Independent Variables*

Three meanings of the term "irrelevancy" were defined, each of which formed the basis of an experimental variable for the present study; the definitions and their method of measurement were as follows:

a. Perceptual clutter. Four levels of this variable were used, in each of which a fixed percentage of cities was added and placed randomly on the map. These cities, however, contained no information and were completely detached from the "information bearing" cities; they were included solely as "noise." Nine maps contained no additional cities (a control condition); nine maps contained 25 percent more cities; nine contained 50 percent more cities; and nine contained 75 percent additional cities.

b. Noninformative irrelevancy. This irrelevancy was a change in format

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[2] The rationale of this type of gaming situation has been presented elsewhere. The interested reader is referred to Silver *et al.* (20).

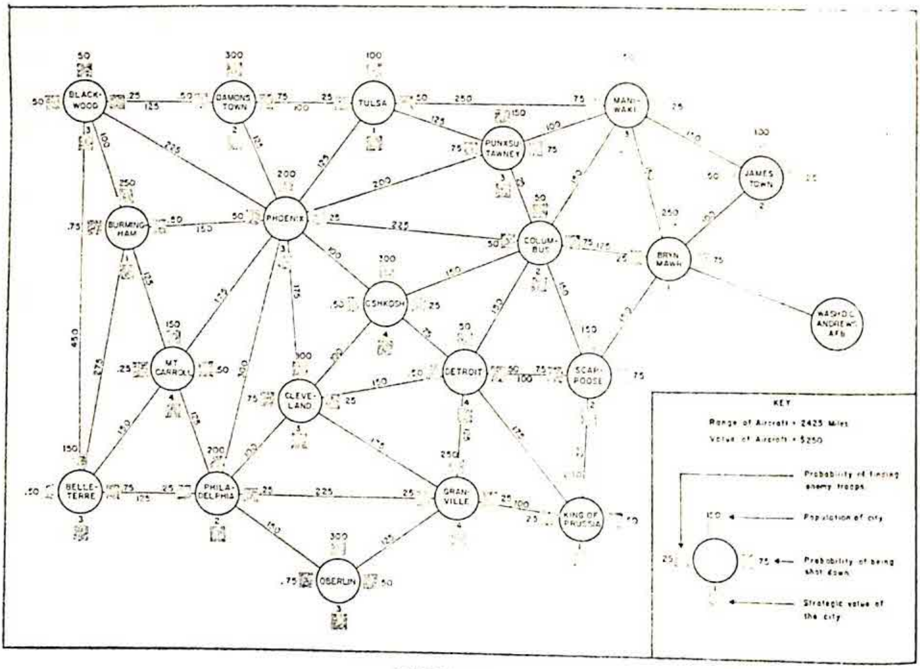

FIGURE 1
SAMPLE DISPLAY

for which interpretation rules had not been given to the subject, and which did not affect the solution to the problem. Three levels of this variable were determined. The first level was a control with no irrelevancy. In the second level, called "nonrandom, noninformative irrelevancy," 25 percent of the symbols standing for a particular fact were rotated 45° clockwise. In the third level ("random, noninformative irrelevancy"), a random 25 percent of all the symbols on a map were rotated 45° clockwise.

c. Coding redundancy. "Coding redundancy" was defined as the use on a display of some coding scheme that was unnecessary for the proper solution of the display problem. Two dimensions may be used to code the same fact, either one of which may be considered to be redundant or irrelevant with respect to the other. Because the use of alphanumeric symbols was common across all levels in the present study, the use of color was considered "redundant"; however, this is a matter of preference which does not affect the interpretation of the experimental results. Three levels of this variable were distinguished:

1. Color relevant. In this case, information is coded only by color; this condition represented a control for the other two levels.

2. *Yoked redundancy.* In this condition, information was coded both alphanumerically and by color. The association of a particular color with a particular alphanumeric symbol was constant across all maps and all conditions; however, the relationship between the color and the alphanumeric symbol was not stated to the subject.

3. *Unyoked redundancy.* In this case, the association of a particular alphanumeric symbol with a particular color was random and, of course, the subject was not made aware of any possible contingencies.

4. *Procedure*

The subjects were randomly divided into three groups of 10. Each group received one level of noninformative irrelevancy combined with all levels of perceptual clutter and coding redundancy; thus, each subject solved 12 maps. The order of presentation was randomized individually for each subject.

5. *Instruction and Game Rules*

S was given the following instructions:

> The purpose of this military reconnaissance game is to determine which display variables contribute most to high-quality decision making. In this experiment you will serve as a reconnaissance pilot in a simulated flight. In the next few hours you will work through a series of maps. For each map you will work with a plane which has a specified range and a monetary value. On each map you will find a key which explains the symbols on that map. Maps differ in several ways, so be sure that you read the key carefully. Also, information associated with a given city will vary from map to map.
>
> A time limit will be placed on each map. Your task will be to choose what you consider to be the best flight route and to complete your flight by returning to your point of departure (Washington, D.C.) within the specified time limit. You will not be able to reconnoiter all the cities on a map.
>
> On your answer sheet (there is one for each map) record your name after the letter S, the map number, and the flight route. So that you will have some guides in making your decisions, the game has been based on rules of economic utility. That is, rules are laid down governing gains and losses and your task will be, working within the framework of the rules, to maximize gains and minimize losses, thereby maximizing profit. Given the rules of the game, your economic profit will directly indicate the quality of your decisions. At the end of the experiment, you will receive a percentage of the net profit gained on your flights.

The rules under which *S* was asked to operate were as follows:

1. The reconnaissance pilot must file a flight plan listing the route by which the mission will be accomplished.

2. If the specified range indicated for your aircraft is exceeded in any problem, the value of that mission will be divided by 10. The travel distance includes the return to the starting point.

3. Points will not be given for any city reconnoitered more than once.

4. The probability of finding enemy troops in a given city (P_{fet}) will be .25, or .75.

5. The probability of being shot down (P_{sd}) by enemy ground-air weapons will be .25, .50, or .75.

6. The strategic value of a city (S_{vc}) will be rated as 1, 2, 3, or 4.

7. The population of a given city (P_{op}) in thousands will be 50, 100, 150, 200, 250, or 300 inhabitants.

8. The value of reconnoitering a given city is equal to the population of that city times the probability of finding enemy troops there, plus the strategic value of that city times the population of that city.

9. The disadvantage of reconnoitering a given city is equal to the value of the aircraft times the probability of being shot down by enemy ground-air weapons.

10. The total value of reconnoitering a given city is equal to the probability of finding enemy troops times the population of that city, plus the strategic value of the city times the population of the city, minus the probability of being shot down times the value of the plane being used.

11. The total value of the reconnaissance flight plan is equal to the sum of the values as computed in rule 10 for each city reconnoitered in the flight plan.

After *S* read the instructions and rules he was given sufficient time to ask questions for the purpose of making sure he understood what was required of him. The experiment was continued only after *E* felt that *S* clearly understood the rules and instructions.

6. *Analysis of Data*

Each *S*'s profit score, computed by the formula in rule 11, was expressed as a percentage of the total *possible* profit on the display. These percent effectiveness scores (PES) were arc-sine transformed and cast in a Lindquist type VI design (15), and an analysis of variance performed. Significant effects were further analyzed via the New Duncan Multiple Range Test (5).

C. Results

The analysis of variance on the transformed PES resulted in three effects reaching significance: clutter ($F = 4.09$, $p < .005$; $df = 3{,}54$); coding redundancy × clutter ($F = 3.94$; $p < .005$; $df = 6{,}54$); and coding redundancy × noninformative irrelevancy ($F = 4.46$; $p < .005$; $df = 4{,}81$).

The significant effect of clutter is shown in Figure 2. The associated Duncan test is given in Table 1.

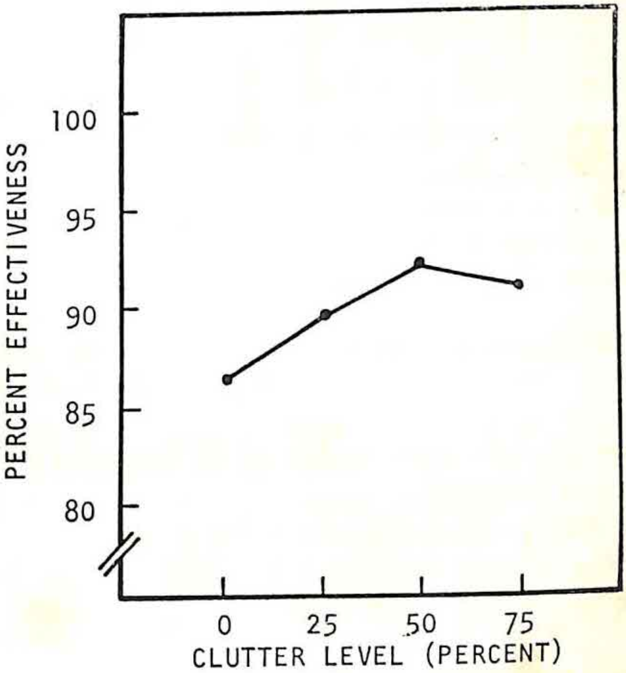

FIGURE 2
Relationship Between Perceptual Clutter and Effectiveness

It may be seen that the addition of a moderate level of clutter facilitates performance, the function becoming asymptotic at some point prior to 25 percent.

Figure 3 presents the interaction of clutter and coding redundancy. Table 2 presents the associated Duncan Test.

The "unyoked" redundancy curve shows that the clutter function shown in Figure 2 is really due to this condition. One should also note that yoked redundancy is superior to the color-relevant condition only at low clutter lev-

Table 1

Summary of Duncan's New Multiple-Range Test

Performed on Percent Effectiveness Measures for Clutter

Clutter Level	Mean	Significance*
1	86.11	
2	89.78	│
3	91.04	│
4	91.86	│

*Differences significant at $\alpha = .05$. Any two means not bracketed by the same line are significantly different; any two means bracketed by the same line are not significantly different.

els. Finally, the Duncan Test (Table 2) indicates that the unyoked redundancy-50 percent clutter condition is significantly better than all other combinations.

Figure 4 and Table 3 present the data for the noninformative irrelevancy and coding redundancy interaction.

These data indicate that within each coding redundancy condition, there is a rather clear progression toward random noninformative irrelevancy being facilitative. Indeed, with the exception of the color-relevant case, merely adding irrelevancy (random or not) is sufficient to improve performance.

D. Discussion

The present study failed to replicate the effects of irrelevancy found in the two types of study reviewed earlier in this paper. Those studies indicated that irrelevancy at best has no effect, and at worst degrades performance. Nor were the findings of Rappaport (19) replicated; that study suggests that in the presence of noise ("clutter" in the present study) redundancy (yoked redundancy) would be facilitatory. The results of the present study indicate rather clearly that, in a complex problem-solving situation, not only is irrelevancy facilitative, but also that making the irrelevancy random further aids performance.

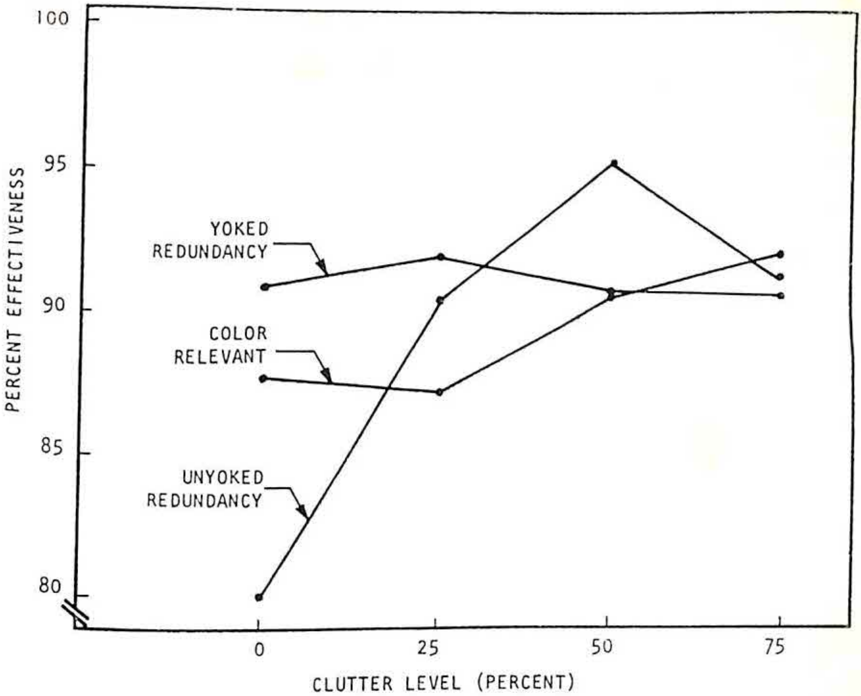

FIGURE 3
RELATIONSHIP BETWEEN CLUTTER AND CODING REDUNDANCY ON EFFECTIVENESS

Previous studies of the effect of coding redundancy (e.g., 6, 14) using a search-discrimination-time paradigm have shown that double coding is more efficient than coding on one dimension alone. The data of the present study suggest that, when the task is of a complex problem-solving nature, the effect is valid only when there are relatively low amounts of irrelevancy present in the stimulus field. Furthermore, the divergent-convergent effects of the color-relevant and yoked-redundancy conditions are also produced by increasing the amount of relevant information (20, Fig. 3, p. 112). This latter study used a problem situation very similar to the present study. We shall return to this effect later in this section.

At a naive level, the present study results would seem to fly in the face of common sense. Given this, explanations are not easy to come by. However, one can begin to formulate such an explanation (assuming the necessary reproducibility of results) by noting the following:

1. The stimulus field was structured *and* meaningful to *S*. A previous

Table 2

Duncan's New Multiple-Range Test Performed on Clutter by Coding Relevancy Interaction

Interaction[a]	Mean	Significance*	
A3, B1	79.97		
A1, B2	86.97		│
A1, B1	87.63		│
A2, B3	90.15	│	│
A3, B2	90.16	│	│
A1, B4	90.29	│	│
A1, B3	90.44	│	│
A2, B1	90.73	│	│
A3, B4	91.08	│	│
A2, B4	91.74	│	│
A2, B2	92.21	│	
A3, B3	94.98		

[a] A1 refers to color relevancy; A2 to yoked redundancy; and A3 to unyoked redundancy. B1-B4 refer to increasing levels of clutter.

*Differences significant at $\alpha = .05$. Any two means not bracketed by the same line are significantly different; any two means bracketed by the same line are not significantly different.

study (14) demonstrated that such situations alter radically the effects of variables whose effects had been studied in meaningless situations.

2. The number of alternative decision patterns available for *S* is very large.

3. The possibility of *S* being able to determine rationally his moves by systematically computing payoffs for each alternative set is very small.

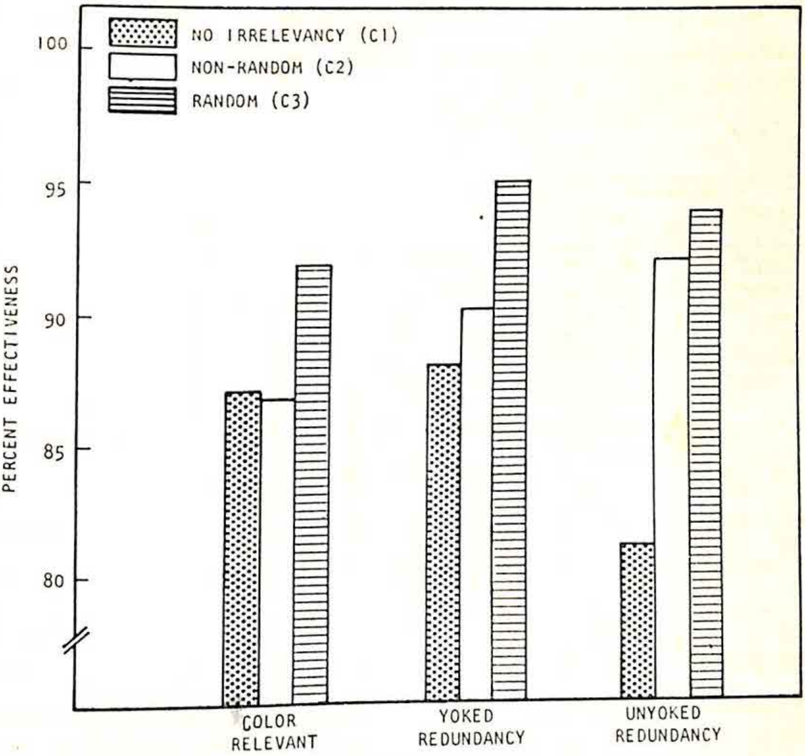

FIGURE 4
RELATIONSHIP BETWEEN NONINFORMATIVE IRRELEVANCY AND CODING REDUNDANCY ON EFFECTIVENESS

4. The present situation is one in which the perceptual load is very great.

One might postulate that the first act taken by *S* when confronted with such a problem is the decision of what is relevant and what is not. Or, put another way, *S* must articulate the figure-ground components of the field. If we argue that such articulation is a very primitive process—and there is evidence to support such a view (e.g., 8, 12)—then it is reasonable to suppose that *S* will attempt such differentiation in all cases. When no ground is present, *S* will attempt to find one, in the process ignoring some critical elements of the field. When obviously irrelevant information is given (and the more obvious the better), *S* immediately places it in a ground and proceeds on his way, secure in the knowledge that the articulation has taken place.

Table 3

Duncan's New Multiple-Range Test Performed on Coding Irrelevancy by Noninformative Irrelevancy Interaction

Interaction[a]	Mean	Significance*				
A3, C1	81.12					
A1, C2	86.92					│
A1, C1	87.19				│	│
A2, C1	87.90			│	│	│
A2, C2	90.22		│	│	│	
A3, C2	91.95	│	│	│		
A1, C3	92.39	│	│			
A3, C3	94.07	│	│			
A2, C3	95.05	│				

[a] A1 refers to color relevancy; A2 to yoked redundancy; and A3 to unyoked redundancy. C1 refers to no irrelevancy; C2 to nonrandom irrelevancy; and C3 to random irrelevancy.

*Differences significant at $\alpha = .05$. Any two means not bracketed by the same line are significantly different; any two means bracketed by the same line are not significantly different.

However, when the amount of information (either relevant or irrelevant) reaches a certain critical level, channel capacity considerations become paramount. At this point *S* will use stimuli that are coded in the most efficient way possible: i.e., color-relevant (20). Nevertheless, the need for figure-ground articulation is still present. At this point, *S* constructs what might be called a pseudo-ground; that is, if there are characteristics of the relevant stimuli that *appear* irrelevant (i.e., misalignment of stimuli), these become the (pseudo) ground; and, finally, the more obvious these aspects are, the easier will be the articulation. If such aspects are not present, then *S* will recapitulate the process discussed in the previous paragraph.

This interpretation also suggests (because of the problem-solving nature of the present study) that the concept of figure-ground articulation applies with equal force to cognitive processes, as well as perception. Since figure-ground perception, as well as the effect of irrelevancy, has been shown to be affected by developmental events (e.g., 11, 21), one might profitably examine its genetic course in cognition. It will be recalled that Katz (11) found that young children are unaffected by the presence of irrelevant cues. If Katz's results could be replicated with a problem-solving situation more nearly like that used in the present study, then those results together with the present study would suggest some rather interesting conclusions. For example, one could postulate that as the child grows he learns what things can be irrelevant and therefore placed in the ground. He also learns, at some later time, that when there is no ground, or when the field is too dense to permit the use of obviously irrelevant elements as a ground, that one can construct a ground out of minor variations in the relevant stimulus elements.

The lack of significant differences between ages 6-11 found by Katz (11) would suggest that this process occurs at a point later than age 11. Naturally, the verification of this developmental hypothesis will require an empirical test; however, it is hoped that its statement here will serve as a stimulus for further experimentation.

Certainly, the present study demonstrates that the ability of the organism to disregard and even utilize irrelevant information has by no means been thoroughly investigated. Whatever may be the effect of irrelevancy on simple decision making, concept formation, or search-discrimination time, such effects tell us little about the process of solving complex problems.

E. Summary

The present study investigated the effects of visual information irrelevancy on complex decision making. Three types of irrelevancy were defined (clutter, noninformative irrelevancy, and coding redundancy) and incorporated as independent variables in the research. Thirty male college *S*s solved a set of static problems involving decision making with a known payoff, but where the output would be difficult for *S* to estimate accurately. Results indicated that, under the conditions of this study, irrelevancy is facilitative for decision making and the more random the irrelevancy, the more adequate the solution. These findings were discussed within the framework of a theory that postulated that irrelevancy aids in the figure-ground articulation of the cognitive field.

References

1. Archer, E. J. Identification of visual patterns as a function of information load. *J. Exper. Psychol.*, 1954, **48**, 313-317.

2. Archer, E. J., Bourne, L. E., & Brown, F. G. Concept identification as a function of irrelevant information and instructions. *J. Exper. Psychol.*, 1955, **49**, 153-164.
3. Boynton, R. M. Recognition of criterial targets among irrelevant forms. In J. W. Wulfeck & J. H. Taylor (Eds.), *Form Discrimination as Related to Military Problems*. Washington, D.C.: Nat. Acad. Sci., Nat. Res. Council, 1957. Pp. 175-183.
4. Detambel, M. H., & Stolurow, L. M. Stimulus sequence and concept learning. *J. Exper. Psychol.*, 1956, **51**, 34-40.
5. Duncan, D. B. Multiple range and multiple *F* tests. *Biometrics*, 1955, **11**, 1-42.
6. Eriksen, D., & Hake, H. Multidimensional stimulus differences and accuracy of discrimination. *J. Exper. Psychol.*, 1955, **50**, 153-160.
7. Feallock, J. B., & Briggs, G. E. A multiman-machine system simulation facility and related research on information-processing and decision making tasks. *USAF AMRL Tech. Rep.*, 1963, No. 63-48.
8. Hebb, D. O. Organization of Behavior. New York: Wiley, 1949.
9. Henneman, R. A. The effect of irrelevant information upon complex visual discrimination. In J. W. Wulfeck & J. H. Taylor (Eds.), *Form Discrimination as Related to Military Problems*. Washington, D.C.: Nat. Acad. Sci., Nat. Res. Council, 1957. Pp. 144-151.
10. Heslin, R., & Streufert, S. Task familiarity and relevance on the environment in decision-making. *Psychol. Rec.*, 1968, **18**, 629-637.
11. Katz, P. A. Role of irrelevant cues in the formation of concepts by lower class children. *J. Educ. Psychol.*, 1968, **59**, 233-238.
12. Koffka, K. Principles of Gestalt Psychology. London, England: Routledge & Kegan Paul, 1935.
13. Landis, D., Slivka, R. M., & Silver, C. A. Some determinants of certitude judgments in a complex decision-making task. *Psychol. Rep.*, 1969, **24**, 447-460.
14. Landis, D., Slivka, R. M., Jones, J. M., & Silver, C. A. Visual search time in a structured field. *Psychol. Rec.*, 1968, **18**, 543-552.
15. Lindquist, E. F. Design and Analysis of Experiments in Psychology and Education. New York: Houghton Mifflin, 1953.
16. Mayzner, M. S., Adler, S., Cohen, A., & Schoenberg, K. M. A study of the effects of irrelevant information on the short-term retention of relevant information. *J. of Psychol.*, 1965, **61**, 251-262.
17. Morin, R. E., Forrin, B., & Archer, W. Information processing behavior: The role of irrelevant stimulus information. *J. Exper. Psychol.*, 1961, **61**, 89-96.
18. Namikas, G. A. The effect of the relevance and number of training dimensions on concept identification performance. *Psychol. Rec.*, 1968, **18**, 607-616.
19. Rappaport, M. Redundancy as a stimulus parameter in form discrimination. In J. W. Wulfeck & J. H. Taylor (Eds.), *Form Discrimination as Related to Military Problems*. Washington, D.C.: Nat. Acad. Sci., Nat. Res. Council, 1957. Pp. 161-168.
20. Silver, C. A., Jones, J. M., & Landis, D. Decision quality as a measure of visual display effectiveness. *J. Appl. Psychol.*, 1966, **50**, 109-113.
21. Solley, C. M., & Murphy, G. Development of the Perceptual World. New York: Basic Books, 1960.

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GENERALIZABILITY OF CALIFORNIA PERSONALITY INVENTORY FACTORS*[1]

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A. INTRODUCTION

The California Personality Inventory (CPI) is used widely in a variety of situations: e.g., counselling, predicting academic success, and for various research investigations. The CPI is a well-validated inventory with 480 items which yield 18 scales. Several investigators (e.g., 4) have raised the question as to whether all the 18 scales are independent or overlapping. If the latter is true, then a more parsimonious grouping of items to produce fewer than 18 scales would make the instrument more efficient for practical use. Attempts have been made previously (1, 4, 5, 6) to obtain scales which were based on factor analytic studies of the scale scores. Such attempts yielded two to four factors which were considered descriptive of the personality traits they represent. The advantage of such an approach is to reduce overlapping between scales and thereby reduce their redundancy. As the evidence from these studies (1, 4, 5, 6) showed, factorially determined scales yielded the best possible parsimonious descriptions of the personality traits. However, those who wish to use the 18 scale personality profiles for guidance and counselling purposes may continue to do so.

The factor analytic studies reported indicate that two major factor variances account for the majority of scales, while a few minor factors, the composition of which varied from sample to sample, accounted for the remainder of the variance. The factor analyses were carried out with the use of a variety of techniques (centroid analysis, principal component analysis, etc.), and communalities were estimated differently with the use of highest correlation unities or squared multiple correlations. The rotation of factor-matrix was done differently with analytic orthogonal rotations, as well as subjective oblique rotations. The question may be asked as to whether these factor analytic studies yield sufficiently generalizable factors which may be used for future studies.

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The question becomes all the more relevant, since the CPI is used in Canada with the implicit broad assumption that Canadian sample populations are no different from the American samples on whom the test was standardized. It becomes necessary, therefore, to test this implicit assumption. The intent of this paper is twofold: first, to ascertain the generalizability of factors obtained, and second, to test thereby the assumption of equivalence of sample populations in U.S.A. and Canada.

B. Method

1. *Subjects*

The *S*s were students enrolled in an introductory psychology course at the University of Manitoba. The students could select the project in which they wished to participate in order to obtain credits. The 328 *S*s who participated in this investigation were drawn from various faculties of the university (e.g., arts, architecture, home economics, etc.), thereby providing a cross-section of the freshman student population enrolled at the university. The mean age of 177 boys was 18.9 years and that of 151 girls was 18.5 years. The majority of the students came from Manitoba and other prairie provinces.

2. *The Instrument and Investigative Procedure*

The full scale 480-item California Personality Inventory was administered in the standard way. Each *S* was provided with a test booklet, an IBM answer sheet, and a pencil. The inventory was group administered.

C. Results

The data were machine-scored and 18 scale scores were obtained for each *S*. Two sets of factor analyses were done on 18 × 18 scale-score correlation matrices for males and females. Communality estimates consisted of unities. The correlation matrix was factor analyzed by the principal components method. The axes were rotated orthogonally according to the Varimax Criterion. Eigenvalues of 1.0 were used as the cutoff criterion for rotation.

Table 1 presents the means and standard deviations of the scale scores for males and females. Table 2 shows the unrotated factor matrix, while the rotated factor matrix is shown in Table 3.

D. Discussion

A comparison of the means and *SD*s given in Table 1 with that given in the *Manual* (2) showed that the means of the present sample were somewhat lower and the *SD*s somewhat higher than the normative figures for college students in the CPI Manual. The decision to retain only those factors with eigenvalues ⩽1.0 resulted in five factors which accounted for 72.73 percent of the total variance for females, and 73.33 percent of variance for males. Only the first two factors of the unrotated factor matrix accounted for the sufficiently large percentage of variance to be called common factors. The rest of the three factors in both the matrices were more likely specific factor variances. Thus there is added evidence that the 18 scale scores can be reduced to fewer factors for purposes of meaningful and parsimonious descriptions.

TABLE 1
MEANS AND STANDARD DEVIATION OF 18 CPI SCALES

Variable[a]	Means		Standard deviation	
	Males	Females	Males	Females
1. Do	24.90	24.80	6.58	6.82
2. Cs	17.94	19.46	4.27	4.55
3. Sy	23.21	23.77	5.66	5.51
4. Sp	36.37	35.44	6.78	6.46
5. Sa	21.58	21.73	3.83	4.07
6. Wb	32.48	32.36	6.65	5.95
7. Re	26.03	28.64	6.00	4.89
8. So	34.02	36.29	6.85	5.85
9. Sc	23.45	25.51	8.35	8.55
10. To	19.11	20.85	5.22	5.62
11. Gi	15.11	14.83	7.05	5.99
12. Cm	23.55	24.92	3.64	2.94
13. Ac	23.41	23.64	5.14	5.16
14. Ai	18.39	19.56	4.24	4.16
15. Ie	35.25	36.66	6.71	8.07
16. Py	10.17	9.99	4.09	3.49
17. Fx	11.00	11.71	4.58	4.00
18. Fe	16.11	23.48	3.95	3.44

[a] 1. Do—Dominance; 2. Cs—Capacity for Status; 3. Sy—Sociability; 4. Sp—Social Presence; 5. Sa—Self-acceptance; 6. Wb—Sense of Well-being; 7. Re—Responsibility; 8. So—Socialization; 9. Sc—Self-control; 10. To—Tolerance; 11. Gi—Good Impression; 12. Cm—Communality; 13. Ac—Achievement by Conformity; 14. Ai—Achievement by Independence; 15. Ie—Intellectual Efficiency; 16. Py—Psychological Mindedness; 17. Fx—Flexibility; 18. Fe—Femininity.

The five rotated factors may best be described by those scales which had factor loadings of ±.40 and above.

Factor I was composed primarily of Class I (2) scales: i.e., Dominance (Do), Capacity for Status (Cs), Sociability (Sy), Social Presence (Sp), and Social Acceptance (Sa). In the case of the males, an additional scale, Psychological Mindedness (Py), also showed a loading of .40.

Factor II consisted mainly of Class II scales: i.e., Responsibility (Re), Socialization (So), Self-control (Sc), Tolerance (To), Good Impression

(Gi), and Achievement via Conformity (Ac). Class III scales: i.e., Achievement via Independence (Ai), Intellectual Efficiency (Ie), and Psychological Mindedness (Py) also contributed to Factor II in the male sample.

Factor III was best described by the two scales, Flexibility (Fx) and Achievement via Independence (Ai). A third scale, Tolerance (To), with a loading of .42, also appeared on this factor in the male sample. Thus, Factor III tended to be a specific factor.

TABLE 2
UNROTATED FACTOR MATRIX[a]

	Factor I		Factor II		Factor III		Factor IV		Factor V	
Variables[b]	M	F	M	F	M	F	M	F	M	F
1. Do	64[c]	61	—49	—54						
2. Cs	66	71	—46	—43						
3. Sy	58	63	—58	—56						
4. Sp	47	42	—71	—71						
5. Sa			—69	—67						
6. Wb	78	72								
7. Re	65	64								
8. So	61	51		59	41					
9. Sc	66	63	61	57						
10. To	80	82								
11. Gi	59	76						—51		
12. Cm					59			72	45	
13. Ac	80	83								
14. Ai	63	51			—49	51				—45
15. Ie	74	53					41			
16. Py	51	50								
17. Fx					—66	81	41			
18. Fe				50			—52		70	—60
Percentage of variance	35.30	33.09	15.73	17.47	9.12	9.52	7.62	6.54	5.56	6.11

(Total variance: Males—73.33; Females—72.73.)

[a] Factor loadings of less than ±.40 have been omitted from the table.

[b] 1. Do—Dominance; 2. Cs—Capacity for Status; 3. Sy—Sociability; 4. Sp—Social Presence; 5. Sa—Self-acceptance; 6. Wb—Sense of Well-being; 7. Re—Responsibility; 8. So—Socialization; 9. Sc—Self-control; 10. To—Tolerance; 11. Gi—Good Impression; 12. Cm—Communality; 13. Ac—Achievement by Conformity; 14. Ai—Achievement by Independence; 15. Ie—Intellectual Efficiency; 16. Py—Psychological Mindedness; 17. Fx—Flexibility; 18. Fe—Femininity.

[c] Decimal points have been omitted (e.g., .64).

Factor IV also was a specific factor and was described primarily by two scales, Communality (Cm) and Socialization (So). The female sample showed an additional scale, Responsibility (Re), just as the male sample showed an additional scale, Intellectual Efficiency (Ie), which composed the factor. The highest loading, unmistakably, was on Communality (Cm) in both the samples and, as such, was best described by that scale.

Factor V was a unique dimension for males, but not for females. The Femininity (Fe) scale, which showed near zero loadings on all other factors, appeared in this factor with loadings of .92 and .78 for the male and female samples respectively. All other scales on this factor showed negligible loadings in the male sample. Two scales, Social Presence (Sp) and Intellectual Efficiency (Ie), however, showed substantial loadings which tended to alter the factor description for the female sample.

TABLE 3

ROTATED FACTOR MATRIX[a]

	Factor I		Factor II		Factor III		Factor IV		Factor V	
Variables[b]	M	F	M	F	M	F	M	F	M	F
1. Do	—80[c]	—84								
2. Cs	—72	—72								
3. Sy	—84	—83								
4. Sp	—75	—67								50
5. Sa	—84	—84								
6. Wb			—65	71						
7. Re			—64	56				44		
8. So			—64	55			51	59		
9. Sc			—92	91						
10. To			—67	75	42					
11. Gi			—79	85						
12. Cm							87	89		
13. Ac			—80	77						
14. Ai			—55		65	73				
15. Ie			—46				49			49
16. Py	—40		—43							
17. Fx					87	86				
18. Fe									93	—78

[a] Factor loadings of less than ±.40 have been omitted from the table.

[b] 1. Do—Dominance; 2. Cs—Capacity for Status; 3. Sy—Sociability; 4. Sp—Social Presence; 5. Sa—Self-acceptance; 6. Wb—Sense of Well-being; 7. Re—Responsibility; 8. So—Socialization; 9. Sc—Self-control; 10. To—Tolerance; 11. Gi—Good Impression; 12. Cm—Communality; 13. Ac—Achievement by Conformity; 14. Ai—Achievement by Independence; 15. Ie—Intellectual Efficiency; 16. Py—Psychological Mindedness; 17. Fx—Flexibility; 18. Fe—Femininity.

[c] Decimal points have been omitted (e.g., —.80).

Three of the five factors in this study closely resembled Nichols and Schnell's (5) and Mitchell and Pierce-Jones' (4) three factors. It was decided, therefore, that the three factors in this study be labelled the same way as in Nichols and Schnell's (5) study. Accordingly, Factor I was Person Orientation (Po), Factor II was Value Orientation (Vo), and Factor III was Flexibility (Fx). Factor IV in the present study was labelled Communality (Cm), and Factor V as Femininity (Fe). It is a characteristic feature of the student groups that the Flexibility factor is strongly supported by Achievement via Independence (4, 7).

The differences between factorial structures of the male and female samples were not striking. Only a few minor differences were evident in the scales which composed these factors and should be taken into consideration for interpretation of results. While the first three factors maintained a high degree of congruence across corresponding samples, the last two factors were not equally invariant. However, the factorial congruence of .87 (Table 4) between Mitchell and Pierce-Jones' (4) third factor, labelled as Super-ego Strength, and the fourth factor, labelled here as Communality (Cm), in the female sample, showed the two factors to be highly similar. The fifth factor, labelled here as Femininity (Fe), showed similar trends in other studies (7, 1), and appeared as the unique dimension in male samples, whereas in female samples, the Fe appeared to be mixed with one or two other variables (4, 7).

An examination of Table 4 indicates the factorial congruence between factors of this sample and three of the factorial studies reported previously. The degree of factorial similarity between corresponding factors of three other studies and the present study was calculated by the Wrigley and Neuhaus formula [for details, see (3, pp. 257-258)]. With the exception of Factor III in the female samples, all other coefficients of congruence between corresponding factors ranged from .91 to .99. The coefficients of congruence between three samples on Factor III of females were still high enough: i.e., .81. Thus the question raised earlier about the generalizability of factors obtained was ascertained and the results indicate that the factors are generalizable—at least within the types of samples studied. To the extent that generalizability of CPI factors has been established with respect to English speaking college students in Canada, the assumption of equivalence of sample populations in U.S.A. and Canada can also be maintained. However, in order to establish generalizability of factors, as well as equivalence of sample populations of college students on a large scale, additional studies (including the French speaking students) need to be conducted across Canada. Such a large-scale normative study would still restrict conclusions to college students alone unless a variety of samples (e.g., 2) are also included in future studies.

E. Summary

The California Personality Inventory was administered in groups to 328 *S*s who were students in the introductory psychology courses at the University of Manitoba. Eighteen scale scores for each *S* were correlated separately for groups of males and females. Factor analyses of 18 × 18 correlation matrices yielded five factors in each group. The coefficients of

TABLE 4
COEFFICIENTS OF FACTORIAL SIMILARITY

	Factor I (Person Orientation)		Factor II (Value Orientation)		Factor III (Flexibility)		Factor IV (Communality)	
	M	F	M	F	M	F	M	F
Schludermann *vs.* Springob & Struening	—.9818		—.9878		.9258			
Schludermann *vs.* Nichols & Schnell	—.9685	—.9655	—.9919	.9705	.9128	.8085		
Schludermann *vs.* Mitchell & Pierce-Jones		—.9760		.9828		.8071		.8704

similarity calculated between corresponding factors of the previous and present studies indicated a high degree of similarity for three of the factors. The results provided evidence for generalizability of CPI factors, as well as support for the assumption of equivalence of sample populations studied so far in U.S.A. and Canada.

REFERENCES

1. CRITES, J. O., BECHTOLDT, H. P., GOODSTEIN, L. D., & HEILBRUN, A. B., JR. A factor analysis of the California Psychological Inventory. *J. Appl. Psychol.*, 1961, **45**, 408-414.
2. GOUGH, H. G. Manual for the California Psychological Inventory (rev. ed.). Palo Alto, Calif.: Consulting Psychologists Press, 1964.
3. HARMAN, H. H. Modern Factor Analysis. Chicago, Ill.: Univ. Chicago Press, 1960.
4. MITCHELL, J. V., & PIERCE-JONES, J. A factor analysis of Gough's California Psychological Inventory. *J. Consult. Psychol.*, 1960, **24**, 253-256.
5. NICHOLS, R. C., & SCHNELL, R. R. Factor scales for the California Psychological Inventory. *J. Consult. Psychol.*, 1963, **27**, 228-235.
6. SPRINGOB, H. K., & STRUENING, E. L. A factor analysis of the California Psychological Inventory on a high school population. *J. Counsel. Psychol.*, 1964, **2**, 173-179.
7. VELDMAN, D. J., & PIERCE-JONES, J. Sex differences in factor structure for the California Psychological Inventory. *J. Consult. Psychol.*, 1964, **28** (No. 1), 93.

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PSYCHOLOGICAL NEEDS AND THEIR DEVELOPMENT DURING ADOLESCENCE*

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A. INTRODUCTION

This study constitutes a normative survey of the psychological needs of a selected group of adolescents. Its purpose has been to compare the psychological needs of adolescents by age and to determine to what extent such needs are satisfied. An index of an individual's needs was obtained by means of a questionnaire requiring respondents to indicate a desire or lack of desire to play various social roles. A comparison of his needs index with the extent to which each subject felt he actually was playing both the liked and disliked social roles provided a measure of his need satisfaction.

B. METHOD

1. *Subjects*

Three hundred thirty boys and 324 girls enrolled in the 7th through the 12th grades in a midwestern city of 12,000 comprised the sample used in this study. Their ages ranged from 12 through 20. Because of the smaller number involved 19 and 20 year olds were combined as one category and 12 and 13 year olds as another. The years 14 through 17 were each treated as separate age categories. The questionnaire was originally submitted to the entire 7th through 12th grade population of the city, consisting of 725 children. However, of these, 71 questionnaires were not usable, with the result that the analysis was performed upon the responses of 654 children.

2. *The Instrument*

The instrument was an adolescent needs questionnaire[1] previously described by Lucas (2), Lucas and Horrocks (3) and Benimoff and Horrocks (1).

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[1] The needs questionnaire, modeled after a format originally used by Rogers (4), was cooperatively formulated by a group of graduate students in psychology working under the direction of J. E. Horrocks, and was first used by C. M. Lucas (2), one of their number, for his doctoral dissertation at The Ohio State University. Among these students were D. Bowlus, H. Phelps, D. Griffiths, R. Blackwood, S. Weinberg, V. Bell, and R. Murray.

The form of the questionnaire as used in the present study consisted of 90 items, each item revolving around characteristic roles of young people and consisting of four parts. The first statement of each item portrays a fictitious person in a typical social role. Both the social role and the name of the characters vary from item to item. The second part of each item takes the form of a question requiring the respondent to compare his self-concept with the role of the character portrayed in the first statement. This question always asks the following: "Am I like him?" The third part of each item always asks: "Do I want to be like him?" and cites a possible need. The fourth part of each item, not used in the present study, asks the question, "Whom do I know in school like him?" Two forms, one for boys and one for girls, differ in the proper names used to conform to the sex of the respondent but portray identical roles item for item.

In answering parts two and three of each item ("Am I like him?" and "Do I want to be like him?") the respondent has two possible choices, indicated by a "Yes" and "No" box to be checked.

Roles are designed to reflect eight different areas of social participation: (*a*) self, (*b*) unisexual pair, (*c*) heterosexual pair, (*d*) unisexual peer group, (*e*) heterosexual peer group, (*f*) family, (*g*) school, and (*h*) other adults. The social setting designated as self provides a general self-reference inclusive of all social relationships. An example of this category is an item reading, "Luke always stays out of trouble." The other social setting categories are arranged by employing a phrase representative of the setting. An item in the boys' form of the questionnaire, "Harry can get along very well without a boy-friend" establishes a unisexual pair relationship by using the statement, "without a boy-friend." A parallel item in the girls' form reads, "Joyce can get along very well without a girl-friend." An item on the boys' form illustrating relationship with other adults reads, "Don makes sure what older people think about it before doing anything." The parallel girls' form item reads, "Joan makes sure what older people think about it before doing anything."

Individual items are also differentiated by needs they have been structured to represent. It is assumed that the desire to play a given role reflects a need on the part of the respondent. The following needs have been hypothesized and translated into social roles: (*a*) acceptance, (*b*) achievement, (*c*) affection, (*d*) approval, (*e*) belonging, (*f*) conformity, (*g*) dependence, (*h*) independence, (*i*) mastery-dominance, (*j*) recognition, (*k*) self-realization, and (*l*) understanding.

Thus, the format of each item was as follows:

Luke almost always stays out of trouble.		
Am I like him?	Yes	No
Do I want to be like him?	Yes	No

3. *Treatment of Data*

One of four possible answer combinations can be made by a respondent for each of the 90 items: (*a*) Yes-Yes, (*b*) Yes-No, (*c*) No-No, and (*d*) No-Yes. Each subject's response to each item was coded for recording on IBM sheets. The IBM sheets were sorted by age, and these in turn were sorted by sex. A tally was made of all responses keyed Yes-Yes and Yes-No, as well as all responses keyed No-No and No-Yes. This provided a total of Yes responses for the "like him" and "want to be like him" categories classified by age and sex. These tallies were then translated into percentages, as well as chi square values. Thus, at each age level, there was obtained separately for the sexes the proportions of individuals who perceived themselves as playing the role illustrated in the item, as well as the percentages that regarded this role as desirable.

Seven of the 90 items in the questionnaire are worded in the negative ("Older people sometimes treat Janice as if she were a young girl") and were scored in the negative to facilitate comparison with other items.

The goals of adolescent age groups classified by sex were identified by statistically significant frequencies of "Yes" responses. These goals were then placed in groupings based on the common age ranges over which a group of goals was significant. Those goals common to the same age range were then regrouped on the basis of similarity. An analysis of the data indicated that at any given chronological age boys and girls tended to have different needs patterns and needs satisfactions as they proceeded through the years of adolescence. To a considerable extent, the items grouped together for girls in a common age range appeared together for different age ranges in the case of boys. The differential combinations for boys and girls of the same items over common age periods may be taken as at least a partial indication of the validity of the results obtained in this study.

The various groups or clusters of items were labeled for purposes of identification although their commonality is difficult to convey by an appropriate name or phrase. Interpretations are presented with each cluster of items in the section on results.

After identifying goals it was determined to what extent these goals were attained for various age and sex groups. For those items identified as goals, the responses to the second part of the item, "Am I like him?" were analyzed again by the chi square method. Goal attainment is reported on the basis of statistically significant "yes" and "no" response and nonsignificant frequencies of response distribution for individual groups.

4. *Use of Chi Square*

The major variables employed in this study are ego, sex, need, social situation, goals, and roles. There are seven age groups, two sex groups, 12 need groups, and eight social situations. The ideal statistic would show the relation of age, sex, and social situation to goals and goal attainment. However, the likelihood of presenting an intelligible summary of differences in goals between age groups, sex, and social situation would be poor when one considers that 90 items were involved.

A goal is considered to be typical of a group if it receives, at a statistically significant level, more "Yes" and "No" responses. The index of change is significance *versus* nonsignificance for individual groups. The logical measure was to test for significance between groups. This latter method would have presented an impossible multiplicity of comparisons. The former approach permits a two-fold comparison. A combination of comparisons between groups can be fitted into one of two classes, significant or nonsignificant goals. To quantify measures of significance use is made of percentiles. The proportion of a population indicated by a chi square measure of significance varies a good deal with the size of the group. Furthermore, a significant chi square for any group can include any portion over a range. It was, therefore, felt that an index of percentiles was desirable.

There are four types of indices employed in this study to describe distribution of responses among the groups studied. These include: (*a*) statistically significant frequencies of "Yes" responses, (*b*) statistically significant frequencies of "No" responses, (*c*) nonsignificant frequencies of responses, and (*d*) percentiles. A significant chi square value at the one percent level for all age groups of either boys or girls averages 68 percent of the sample, with a maximum deviation of four percent. Two notable exceptions are the 19-year-old girls for which the one percent level of significance includes not less than 90 percent of the group and the 19-year-old boys for which the one percent chi square level of significance requires 100 percent agreement in response.

C. RESULTS[2]

1. *Statistically Significant Girls' Goals*

This section presents the items which were statistically significant representations of goals by various age ranges of girls. They are grouped together on the basis of the complete age range over which they appeared statistically significant, and interpretations have been made as to the needs represented by these various groups of items. For some of the items listed one or two age groups did not show statistical significance. In such cases the age is reported in parentheses following the item.

For girls there were eight clusters of items in all: (*a*) work-success, (*b*) affection, (*c*) social status, (*d*) conformity to external authority, (*e*) group membership, (*f*) blame avoidance-approval, (*g*) adequacy-self assertion A, and (*h*) adequacy-self assertion B. Three of these clusters of items appeared to be statistically significant—(*a*), (*b*), and (*c*) above—for "Yes" responses over the entire age range, 13 through 19, of girls included in this study.

a. Work-Success (13 through 19 age group). Work-success, significant across the entire age range of 13 through 19 is represented by eight items having several qualities in common. These items involve goals in which initiative and action are vested in the self as the dominant factor. Involved is the desire to put forward one's best efforts and to attain high-level goals. Emphasis is on goal attainment rather than on consummation of rewards. Reward depends on the individual's standards and self-evaluation rather than on evaluation by others. Consideration of such goals involves self-concepts of strength, competence, adequacy, decisiveness, persistence, and effort.

The work-success cluster included the following items:

No. 19. When Kathleen does something, she does the best she can.

No. 28. Mildred gets some of the best marks in her class (age 16).

No. 43. Edna has a chance to show how well she really can do (age 17).

No. 56. Nothing stops Caroline from doing the best she can.

No. 62. Kitty usually succeeds when she works hard for what she wants.

No. 72. Winifred does most things rather well.

Two other items related to this cluster introduced a factor of recognition of one's success and competence. These goals are somewhat different as they require a greater degree of favorable response from others. They seem to put more stress on status, prestige, and recognition and less stress on accomplishment than did the previous six items.

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[2] Number in parentheses following the item indicates the age at which this item is not statistically significant. The number before the item indicates the number of the item in the needs questionnaire.

No. 46. The other girls listen to Kay when she makes suggestions.
No. 51. Martha is the leader when boys and girls get together.

b. Affection (13 through 19 age group). Affection, also significant across the entire age range of girls is represented by a cluster of five items indicating desire for strong assurances of favor and affection. In all of these items the subject obtains response from others. There is no action by the subject, no solicitation of favor. The response sought includes such terms as "like," "think a lot of," "will stand by," and "think a great deal of." No condition is placed on the receipt of this response. The subject is the sole recipient of the action. All of the items contain an indication of degree of affection: "Everybody likes," "thinks a lot of," "stand by her no matter what," "how much they like her," "a great deal." The affection cluster included the following items:

No. 3. Everybody likes Marjorie (age 16).
No. 16. The girls in Anne's crowd think a lot of her.
No. 26. Velma has one loyal friend who will stand by her no matter what they say.
No. 36. The girls and boys let Lois know how much they like her (age 14).
No. 45. Estelle's closest friends think a great deal of her.

c. Social Status (13 through 19 age group). Social status, significant across the entire age range consisted of a cluster of six items registering the desire to be accepted to equal membership status and to be free from criticism or derogation. In all of these items the subject compares her treatment by others on her behavior with a standard of what is normal or desired for her peer status. These items reflect a sensitivity to social censorship and social standards, as well as a concern with social status. It shows the individual's identification with a group frame of reference. Heavily represented is the heterosexual group. These items were as follows:

No. 24. May can talk to her parents about her thoughts and problems.
No. 25. Vicky does almost everything the other boys and girls do.
No. 30. The other boys and girls seldom say anything bad about Dorothy (age 16).
No. 33. When a crowd of boys and girls are having fun they like to have Emily along (ages 16 and 17).
No. 53. Older people sometimes treat Janice as if she were a younger girl. (This item is scored negatively.)

No. 69. Girls and boys sometimes make fun of Barbara. (This item is scored negatively.)

d. Conformity to External Authority (13 through 18 age group). The statistically significant items in the age range 13 through 18 appeared to have in common an indication of desire to conform to outward authority. These items were

No. 4. Joan makes sure what older people think about it before doing anything.
No. 29. Lillian does most of the things she is supposed to do.
No. 57. Connie does what her parents expect her to do (age 16).
No. 63. Vivian behaves like older people want her to (age 14).

The following items were statistically significant over this age range, but did not appear to fit into a pattern having common elements with the other four:

No. 35. Daisy spends a lot of time with a swell bunch of boys and girls who are a lot of fun.
No. 61. Nancy's teachers feel that she is a fine person.
No. 88. Mary Ann goes to her best friend when she has something to get off her mind.
No. 65. The boys and girls almost always help Rose when she needs help.

e. Group Membership (13 through 15 age group). In the age range of 13 through 15, two clusters of items appeared statistically significant. One of these consists of four items. It shows the individual's desire for group membership. While this group of items is somewhat similar to the social-status cluster of items, there are some differences. It ignores qualifying or instrumental conditions of group membership, such as blame avoidance and conformity. It does not contain the element of self-comparison with peer or parental status. It is circumscribed to belonging in a group and being accepted by the group. Also of significance, while all group references in the Social-Status cluster involved heterosexual groups, all these items referred to unisexual groups.

No. 7. All the girls in Mabel's crowd think she is a swell person to have around.
No. 10. Ruth is always welcome to go around with a bunch of girls.
No. 20. The other girls often ask Joy to do things with them.
No. 70. Elaine and her family enjoy doing things together.

f. Blame Avoidance-Approval (13 through 15 age group). The second cluster of items showing statistical significance across the 13 through 15 age *i. Miscellaneous Significant Items.* A series of items appeared at various ages which do not fit into any need cluster for their respective periods. Age groups 13 through 15:

> No. 9. Jane has a boy-friend who seems to understand her.
>
> No. 41. Sara has a girl-friend who doesn't like some of the things Sara does. (This item is negatively scored.)

Age groups 14 through 18:

> No. 66. Marcia's parents show her in many ways that they love her (age 17).
>
> No. 15. Peg and another girl almost always go around together and do lots of things.
>
> No. 67. It bothers Virginia if she doesn't do her best.
>
> No. 81. Greta doesn't like to do things that are too easy for her.
>
> No. 48. Most of Gloria's teachers are very fond of her (age 16).
>
> No. 68. The other boys and girls look up to and admire Phyllis (age 17).
>
> No. 75. Lila's family let her make up her own mind about everything.

Age 15:

> No. 50. Older people like to have Betty around.
>
> No. 64. Harriet's boy-friend tells her he is proud of her.
>
> No. 80. Adults keep telling Shirley how she should act. (This item scored negatively.)
>
> No. 86. Cora has a boy-friend who lets her know that he likes her.

Of eight need clusters found among 13-year-old girls, the first to drop out were those of blame avoidance and group membership. These items were no longer statistically significant after age 15. Conforming to external authority dropped out after age 18. There were only two clusters of items not present at age 13, both involving adequacy-self assertion. These clusters extended over the age ranges of 16 through 19 and 16 through 18. Work-success, affection, and social-status contained items statistically significant over the entire age range. Approval is involved in the social-status pattern: the respondent compares her status with others. The pattern also contained the beginnings of self-assertion, since it indicates aspirations to equal status with others. In contrast to the group membership cluster which contained only unisexual group items, the social status cluster contained heterosexual group items.

It was strange that a general blame avoidance-approval need dropped out after age 15, and conformity to adult authority continued on through age 18. A function of blame avoidance-approval continued within the social status frame of reference. The cluster of group membership dropped out after age

15, but a large element of belonging was involved in identification with peers in the social status cluster.

2. *Statistically Significant Boys' Goals*

Only two clusters of needs characterized boys through the entire 13 through 19 age range, but three clusters characterized the 13 through 18 range. It would appear that a qualitative difference in needs press begins to occur between the 18th and 19th years.

a. Work-Success (13 through 19 age group). A work-success cluster which appears as statistically significant in the all girls' groups also appeared statistically significant in all boys' groups. The items in this cluster were

No. 19. When Gus does something, he does the best he can.

No. 28. Arnold gets some of the best marks in his class (ages 17 and 18).

No. 43. Jerry has a chance to show how well he really can do (age 18).

No. 46. The other boys listen to Hal when he makes suggestions (age 17).

No. 56. Nothing stops Hugo from doing the best he can (age 18).

No. 62. Herb usually succeeds when he works hard for what he wants.

No. 72. Douglas does most things rather well.

b. Conformity to External Authority (13 through 19 age group). The second cluster of items statistically significant in the boys' 13 through 19 age range had to do with conformity and approval:

No. 29. George does most of the things he is supposed to.

No. 57. Walter does what his parents expect him to (age 18).

No. 78. Paul's family approves of most things he does.

Four items which did not fit into any grouping of goals appeared statistically significant throughout the age range of 13 through 19. These items were

No. 10. Bill is always welcome to go around with a bunch of boys he knows.

No. 54. Sometimes the boys can't figure out Ben (age 17). (This item is scored negatively.)

No. 65. The boys and girls almost always help Dan when he needs help.

No. 73. Bert goes to one of the best schools in this part of the state (ages 16 and 17).

c. Affection (13 through 18 age group). In the age range of 13 through 18 there appeared a group of four items which had all the characteristics of the affection cluster found in all of the girls' groups:

No. 26. Chuck has one loyal friend who will stand by him no matter what they say (age 17).

No. 45. Wilbur's closest friend thinks a great deal of him.

No. 61. Art's teachers feel that he is a fine person (age 16 and 17).

No. 66. Donald's parents show him in many ways how much they like him (age 17).

No. 76. Older people think a lot of Harold (age 15 and 17).

d. Group Membership (13 through 18 age group). The five items comprising this need cluster all indicated a desire to belong to a group. This cluster is similar to the group membership cluster for girls over the age range of 15 through 17. One important difference between the group membership clusters for boys and girls is the fact that the former consists of both unisexual and heterosexual group items, while the latter consists only of heterosexual group items:

No. 7. All the boys in Tim's gang think he is a swell guy to have around.

No. 20. The other boys often ask Red to do things with them.

No. 33. When a crowd of boys and girls are having fun, they like to have Ray along (age 17).

No. 35. Sam spends a lot of time with a swell bunch of boys and girls who are a lot of fun.

No. 70. Pete and his family enjoy doing many things together.

e. Blame Avoidance-Approval (13 through 18 age group). The following cluster of items for boys parallels the girls' cluster for blame avoidance-approval which occurred over the girls' age range 13 through 15:

No. 1. Luke almost always stays out of trouble (age 16).

No. 17. Alfred's teachers are always finding fault with him. (This item is scored negatively.)

No. 53. Older people sometimes treat Ralph as if he were a younger boy. (This item is scored negatively.)

Several items appeared as statistically significant over this age range which did not fit any general need cluster:

No. 12. Terry is different from other boys and girls (age 17). (This item is scored negatively.)

No. 22. James doesn't want a job where he will loaf (age 17).

No. 39. Everybody says that Bob will do well for himself when he finishes school (age 17).

No. 77. Instead of just getting by, Adam tries to do his best.

f. Chum-Intimacy (age 13). A cluster of three items at age 13 suggested a need for intimacy and exchange of confidences that can be realized only within a close relationship. These items all center around unisexual relations and indicate the chum relationship identified during early adolescence:

No. 15. Glen and another boy almost always go around together and do lots of things together.

No. 88. Mike goes to his best friend when he has something to get off his chest.

No. 89. Robert almost always asks his boy-friend what he should do about some things.

g. Adequacy-Self Assertion (age 17). A cluster of statistically significant items appeared for age 17 similar to the adequacy-self assertion pattern for girls between the ages of 16 and 19. These items stressed the desire to play mature roles with equal status, freedom of expression, self-confidence and self-assertion in relating to the opposite sex, parents and adults in general. They appeared to express desires for adulthood and acceptance in adult roles:

No. 14. Harold is seldom shy with a girl.
No. 21. The people at home treat Steve like a grown man.
No. 32. Ron has succeeded in getting people to treat him like an adult.
No. 34. Chris can get grown-ups to do some things he wants.
No. 80. Adults keep telling David how he should act. (This item is scored negatively.)

h. Miscellaneous Significant Items. A series of items appeared at various age ranges which do not fit into any need cluster for their respective periods. Age groups 13 through 17:

No. 3. Everybody likes Richard (ages 15 and 16).
No. 24. Harvey can talk to his family about his thoughts and problems.
No. 69. Boys and girls sometimes make fun of George. (This item is scored negatively.)

Age groups 13 through 16:

No. 63. Carl behaves like other people want him to.
No. 74. Fred sometimes breaks school rules because the other boys want him to. (This item is scored negatively.)

Age groups 13 through 15:

No. 4. Don makes sure what older people think about it before doing anything.
No. 16. The boys in Murray's crowd think a lot of him.
No. 25. Leroy does almost everything the other boys and girls do.
No. 30. The boys and girls seldom say anything bad about Albert.
No. 37. Kenneth is like his boy-friend in many ways.
No. 87. Henry's family think he is just about okey in every way (age 14).

3. *Summary of Adolescent Needs*

Work-success, affection, and conformity to external authority appeared to be the most enduring needs throughout adolescence. To these may be added social-status as applying only to girls; group membership and blame avoidance-approval as more applicable to boys.

The work-success cluster of statistically significant items was the only one present in all boys' and girls' groups. Conformity to external authority was present in all of the boys' groups and showed up in all of the girls' groups with the exception of the 19 year olds. Affection present in all girls' groups did not show up amongst the 19-year-old boys. Group membership and blame avoidance-approval present in all of the boys' groups with the exception of the 19 year olds was statistically significant for the girls for only the age range of 13 through 15. Adequacy-self assertion which showed up for all girls' groups from 16 through 19 and in a second cluster from 16 through 18 was present for only the 17-year-old boys. The items in the social status cluster were statistically significant for all of the girls' groups, but this cluster did not show up for any of the boys' groups. Chum-intimacy was present for the 13-year-old boys but for none of the girls' or the other boys' age groups.

The most striking similarity in clusters of items between the two sexes appeared in the case of the work-success cluster, which not only applied to all groups of boys and girls but which overlapped greatly for both sexes. Four of the six items that appeared for girls also appeared in the boys' seven items. This cluster also showed a desire on the part of the girls for leadership and recognition in group activity. This latter need did not appear for the boys. Two of the three items in the conformity to external authority of the boys' cluster duplicated identical items in the girls' cluster of four items. Only two of the items of the affection cluster were duplicated for both sexes. The qualities of this cluster that have been specified in the previous discussion of the girls' cluster also applied to the boys' cluster. There was one striking difference. While none of the items in the girls' cluster seek affection from adults, items in the boys' cluster refer to parents, teachers, and other adults. On the other hand, while none of the items in the boys' cluster seek affection in group relations, two of the items in the girls' cluster refer to affection in relation to unisexual groups and one in relation to heterosexual groups.

Three of the four items in the boys' version of the group membership cluster were duplicated by three of the five items in the girls' cluster. Two of the three items in the blame avoidance-approval pattern for boys were duplicated by two of the four items in the same pattern for girls. Three of the five items in the adequacy-success cluster of boys were found in the seven items of the same cluster for girls.

Throughout the entirety of the adolescent age range for boys and up through the 18 year olds for girls, the growth of independence and adequacy did not preclude the desire to conform to standards of behavior prescribed by the home and other institutions (Conformity and External Authority). On the other hand, in the case of girls, the need for conforming continued, through age 18, while blame-avoidance dropped out after 15. For both boys and girls conformity to home and parental standards, as well as general conformity are indicated. The question as to whether growth brings about an internalization of standards which diminishes the importance of conformity remains in doubt. The fact that this pattern drops out for the oldest girls is suggestive. The dropping out of blame avoidance-approval after age 15 in the case of girls is particularly interesting.

In the case of the girls, the cluster of conformity contained items that are more strongly worded, suggesting a desire for guidance similar to dependence, as suggested in the following selections:

No. 4. Joan makes sure what older people think about it before doing anything.

No. 63. Lillian behaves like other people want her to.

Correctness of behavior looms as more important with girls. In dealing with propriety, codes of behavior take on a more self-conscious and explicit importance. The girls wanted to know what is the correct form. They make it an instrumentality of social intercourse and the self-concept. In conformity, boys appeared less concerned with the propriety of behavior than with getting along with others, as indicated in the following examples:

No. 29. George does most of the things he is supposed to.
No. 57. Walter does what his parents expect him to.
No. 75. Paul's family approves of most things he does.

Social frames of reference appeared to have a broader base and function for girls than for boys. Sensitivity to social criticism which appeared for both boys and girls in the blame avoidance-approval clusters was evidenced strongly in the social status cluster which applied only to girls. Here, disapproval carries an implication of losing one's peer status or of being denied a newly coveted status. Simple blame avoidance-approval dropped out after age 15 for girls and continued for boys through age 18, but the social status cluster continued for all ages among the girls. That peer relations involved more complex and varied emotional needs for girls is shown in numerous patterns. One may hypothesize that numerous satisfactions sought by me along vocational lines are obtained by women in peer social settings. The paradox exists, however, that the same cluster of items which represented the desire to use one's maximum efforts along lines of achievement and success applied as well to both women and men.

The group membership cluster which dropped out for girls after age 15 continued on for boys through age 18. There is a similarity between group references and identification of the social status pattern and group membership. Thus, for the women, peer-group membership continued to have some expression throughout adolescence. The group reference in the group membership cluster of girls was related to unisexual groups only. For boys, both unisexual and heterosexual group relations continued to have importance. There seemed to be a much sharper differentiation in girls of distinction between mixed and single sex groups which did not apply to boys.

While adolescence involves transition to adulthood, a number of very basic concepts essential to maturity were already demonstrated at 13 years of age among the sample used in this study. Indicated are such needs as self-direction, establishing and working for worthwhile goals, and desire for productive activity. These needs, however, center almost entirely around the self-concept and self-evaluation. The goals involve attainment of a more effective self. In contrast, the adequacy-self assertive cluster which was the only cluster that became statistically significant after age 13, referred to social incentives, playing adult roles and being dominant and successful in social relations. With the exception of the work-success cluster, it differed from all of the others in its expression of aggressive masterful desires in relation to the environment. One of the major changes in adolescence may be acquisition of social skills which give expression to basic self-centered, internalized values concerning mastery of one's environment.

4. *Satisfaction of Needs*

Items appearing statistically significant as needs were evaluated for a measure of goal attainment with particular reference to the need clusters discussed in the preceding sections. Distribution of responses to the question, "Am I like him?" (i.e., the person described in the item was submitted to chi square tests of significance).

While boys showed some tendency towards greater goal attainment with increased age, the trend is not as decisive as it is for girls. Nor was there any specific age for boys at which a transition sets in as sharply as it did for girls around age 15. The girls reported greater frequencies of goal attainment throughout adolescence, which generally spread in the areas of group relationships.

In self-evaluation of effort and achievement, the boys' pattern was similar to that for girls with more favorable evaluations by both sexes for items stated in general terms. When items introduce considerations of overcoming obstacles or of being given opportunities, the frequencies of goal attainment decreased. In the area of group relations, boys did not report the growth of leadership which was so marked for girls. This change for girls was much sharper in the heterosexual group area than it was in the unisexual group area.

The area of chum relations in which most age groups of girls showed satisfactory affection relations was also an area of success for boys. For boys, the setting of greatest satisfaction of affection needs was the home and family. Girls indicated that chum relationships undergo change under pressure of adverse group opinion. The trend of greater success for girls in both unisexual and heterosexual group relations indicated in the work success cluster is repeated in both the affection and social status cluster.

The school appeared as a key area of frustration and conflict. In the affection cluster, school was the area showing least satisfaction for boys in the desire to be liked. In the work-success cluster, the item, "Arnold gets some of the best marks in his class," received statistically significant frequencies of "no" responses for all boys' groups except the 19 year olds. This same item for girls showed a slighter degree of difficulty with the 14 and 15 year olds showing significant frequencies of "no" responses. In the blame avoidance-approval cluster, the four oldest groups of girls indicated to a statistically significant degree that "their teachers are always finding fault" with them. For boys, this same item showed a change after age 15 towards greater conflict. To the item, "Jean sometimes breaks school rules because the other girls do," all age groups showed statistically significant frequencies of "yes" responses. In the adequacy-self assertion cluster, girls indicated a decreasing willingness to be told what to do by teachers.

Chum-intimacy, which appeared as a statistically significant cluster of goals for 13-year-old boys but never for girls, did not show any statistically significant figures in relation to attainment or nonattainment of goals.

While the need to conform applied to all groups of boys and to all but the oldest girls, there was a distinct age trend for both sexes towards increasing nonconformity. Growth of independence and conflict was also indicated for girls in the blame avoidance-approval pattern by increased incidence of difficulty with authority, including parents, teachers, and adults.

In the adequacy-self assertion cluster, girls showed a very extensive indication of assuming adult and dominant roles, as well as heterosexual adjustment. While this trend was not as extensively indicated for boys, it was definite.

D. Discussion

If emergence of needs may be deemed a dimension of growth, as was indicated by results of this study, then there is a definite pattern of needs both for boys and girls which identifies a transition to adulthood. In the case of girls, this transition takes place at an earlier age and more extensively than for boys. The goals which become significant after the onset of adolescence overwhelmingly relate to assumption of dominant adult roles and adequate heterosexual adjustment.

When one considers that this group of needs is the only new emergent after the onset of adolescence, it would seem to merit further exploration. The question arises as to whether there exists a relationship between the cessation of needs of blame avoidance after the age of 15 in girls and the strong emergence of adequacy-self assertive needs at 16. Conversely, is the continuation of blame avoidance needs on the part of boys related to a weaker pattern of adequacy-self assertion?

The early existence of values centering around work and productivity has important social significance. How are such drives channeled and aborted in the world of academic and vocational activity? Are these true values or does their large incidence reflect an area of highly moralized attitudes which promote lip service? Furthermore, the existence of such an internalized pattern would suggest a high level of maturity at pubescence, or at least the presence of a strong nucleus of values essential to maturity. One of the main differences between the child and adult may be a process of socialization or indoctrination which enables the child successfully to express previously existing drives.

A marked sex difference appeared in this study. This involved the pattern of goals labeled "social status," which appeared for all age groups of girls and did not appear at all for boys. Sex differences in social needs were also indicated by the differences in age range over which group membership and blame avoidance goals appeared significant. It was further suggested by the greater dependence of girls on peer relations for satisfaction of needs.

The social status cluster points up two differences between the sexes. Simple blame avoidance-approval which dropped out for girls after age 15 and continued for boys seems to be involved in a more complex way in the social status pattern. In this latter reference, it appears as instrumental to one's position in the group. Another difference appeared in the sex composition of social groups in which needs are vested. Group membership which dropped out for girls after age 15 refers entirely to unisexual groups. Social status, which continued for girls throughout, has no reference to unisexual groups but refers considerably to heterosexual groups. For the boys, there was no social status cluster. There was, however, a group membership cluster up through age 18. This cluster contained an equal number of unisexual and heterosexual group items. It appears that the girls draw a marked distinction in function of the sexual composition of groups.

E. Summary

A needs questionnaire was administered to 654 males and females ranging in chronological age from 12 through 20. Information thus obtained was submitted to a study of adolescent needs at different age levels, and the extent to which these needs were satisfied was examined. Items appearing as goals over a given age range were grouped together and interpreted for common needs. These needs were then checked for a measure of goal attainment.

The most enduring needs in adolescence for the population studied were (*a*) to work hard, endeavor, and attain worthy goals, (*b*) to be the special recipient of unqualified and deep expressions of affection, (*c*) to conform to approved behavior, standards, or values designated by reference individuals or groups. The following needs endured for boys but not for girls throughout adolescence, although they are common for girls in the age range of 13 through 15: (*a*) to see one's self as an integral member of a group and to feel accepted and sought after by the group in the sense of maintaining its identity and carrying on its activities, (*b*) to be proper, correct, and adept, to avoid unfavorable criticism or scorn or being an object of blame, to be, in short, the special recipient of approval. Thirteen-year-old boys expressed a special need for a chum with whom they would be free to exchange confidences. Older adolescents (age 16 through 19 for girls, age 17 for boys) expressed a need to play self-assertive roles characteristic of adults involving being competent and effective in relationships with adults, as well as members of the opposite sex.

The most striking changes in the needs of adolescents over their developmental sequence were (*a*) the dropping out of group membership and blame avoidance-approval needs for girls after 15, (*b*) the very general and common emergence of adequacy and self-assertive needs for both sexes at 16 for girls and 17 for boys. Perhaps the most decisive change in needs in adolescence is the growth of the desire for social relationships dominated by one's own

capabilities, mastery, and self-expression, although growth toward mature roles is not accompanied by a decline in the need to conform.

Girls, as compared to boys, exhibited quite different patterns of needs at the various chronological age periods, as well as generally over the whole period of adolescence. Girls expressed a wider range of emotional needs in peer relationships, but belonging to a unisexual peer group declined in importance for them after 15, at a time when it was continuing on for boys. Belonging to a peer group was more related to status values in the case of girls and their need for conformity, bordering on dependence, was stronger than it is for boys.

Needs showed greater degrees of satisfaction as adolescence progressed, although in general girls reported greater satisfaction of needs than did boys.

REFERENCES

1. BENIMOFF, M., & HORROCKS, J. E. A developmental study of relative needs satisfaction of youth: Equilibrium-disequilibrium. *J. Genet. Psychol.*, 1961, **99**, 185-207.
2. LUCAS, C. M. An emergent category approach to the analysis of adolescent needs. Doctor's dissertation, The Ohio State University, Columbus, Ohio, 1951.
3. LUCAS, C. M., & HORROCKS, J. E. An experimental approach to the analysis of adolescent needs. *Child Devel.*, 1960, **31**, 479-487.
4. ROGERS, C. The Clinical Treatment of the Problem Child. Boston, Mass.: Houghton Mifflin, 1939.

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GROUP SIZE AND QUESTION PERFORMANCE OF PREPRIMARY CHILDREN*[1]

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A. INTRODUCTION

The development of skills in asking questions is obviously important, if we believe that children should acquire the motivations and skills for lifelong learning. Through the work of Suchman (9), Sanders (8), and others, some attention has been given to the development of these skills among children in the upper elementary and junior high school years. Almost no attention has been given to the development of inquiry skills in young children even in the major experimental programs of preprimary education (1, 4, 5, 6, 7). This is in spite of the fact that all of them make a great point of developing important intellectual skills.

In administering the Ask-and-Guess Test, the senior author and his associates (10, 11, 12) have found that preprimary and primary school children are seriously lacking in ability to ask questions. In fact, they rarely even understand instructions that require or encourage them to ask questions. This finding was contrary to commonly accepted ideas that young children ask questions all of the time. After observations in many classrooms and talking with many preprimary and primary teachers, however, it did not seem strange that young children are unable to ask questions. In school, at least, they are rarely given a chance to practice asking questions, and the questions that they do dare ask are frequently treated quite brutally. Furthermore, they are given few models of questions asked for the purpose of finding out. The questions their teachers ask are almost all asked to ascertain whether or not the children know something that the teacher has told them or that they have been required to read. The teacher already knows the answer.

During 1967-1968, two experimental classes, employing the "Creative-aes-

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thetic approach to readiness and beginning reading and mathematics" formulated by Mrs. Laura R. Fortson (2, 3), gave some attention to the development of skills in asking questions. It was readily apparent that the ability to ask questions is not as much of a purely developmental phenomena as has commonly been supposed or as one would conclude from the author's experiences with the Ask-and-Guess Test.

It was clear from classroom observations that many of the most penetrating and provocative questions grew out of the interaction of the group. What we observed seemed to be very much like the dynamics of the group creative problem-solving process. The process seemed to deteriorate, however, in the total group of 24 children. Some of them lost interest. Many of the questions were repetitions. Few of the questions went beyond the obvious. We were reminded that the attention span of five-year-olds is very short and that we should not expect sustained attention to an intellectual activity, such as asking questions. We hypothesized, however, that in smaller groups this lack of attention and lack of deep involvement would be largely eliminated. Thus, the present study was designed to investigate the effect of group size on the question asking behavior of five-year-olds enrolled in a preprimary program of educational stimulation.

B. Procedures

The subjects of the study were eight classes of 24 children each, engaged in programs of educational stimulation under the auspices of the University of Georgia Center in Educational Stimulation in Clarke and Clayton Counties and Atlanta City Schools. The mean intelligence quotient of the children enrolled in these classes was 102, as measured by the Peabody Picture Vocabulary Test. The study was conducted by the author with the assistance of experienced graduate students and teachers.

Each of the test sessions was preceded by a brief, fairly standardized mental warm-up exercise conducted in all cases by the author. Each test session was preceded by essentially the following instructions:

> One way of finding out things is to ask questions. I am going to show you a picture and I want you to think up all of the questions you can about what's going on in the picture.
>
> Your questions should be about things that you can't tell for sure by looking at the picture. They should be about the things in the picture, the people, and the things they are doing.
>
> I'll try to write down your questions as fast as I can.

A time limit of 10 minutes was used in all sessions. The stimulus materials consisted of the following four Mother Goose prints: Mary Had a Little Lamb, Old King Cole, Old Woman Who Lived in a Shoe, and Sing a Song of Sixpence. Stimulus materials and group-size treatments were assigned randomly to classes. In the sessions involving 12, six, and four children per group, children within a classroom were assigned randomly to groups. Each class received the 24-member group treatment and at least two of the smaller group treatments. Complete data were obtained for eight 24-member groups, eight 12-member groups, 20 six-member groups and 24 four-member groups.

Each group protocol was analyzed by the author to obtain the total number of questions (excluding repetitions), the number of questions involving awareness of discrepant events or puzzling phenomena, and the number of repeated questions.

C. RESULTS

Table 1 presents the means and standard deviations for total number of questions (excluding repetitions), number of questions about discrepant events, and number of repeated questions for each size of group and *F* ratios.

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR NUMBER OF DIFFERENT QUESTIONS ASKED, NUMBER OF QUESTIONS ABOUT DISCREPANT EVENTS, AND NUMBER OF REPEATED QUESTIONS FOR GROUPS OF 24, 12, SIX, AND FOUR CHILDREN AND F RATIOS

Size group	Number groups	No. Quest. Means	No. Quest. *SD*	Discr. Ev't Means	Discr. Ev't *SD*	Repetitions Means	Repetitions *SD*
24	8	17.25	2.50	2.50	1.30	14.88	3.87
12	8	23.50	7.58	4.38	0.92	4.38	2.13
6	20	28.10	12.05	7.35	2.78	2.55	2.32
4	24	31.12	8.62	8.54	4.99	2.25	1.54
F ratio		4.1363		6.8875		60.5257	
Level of significance		$<.05$		$<.01$		$<.001$	

It will be observed from the data presented in Table 1 that group size has a statistically significant effect on all three of the variables studied.

The negative relationship between group size and number of questions asked appears to have a linear trend. The four-child groups, on the average, asked almost twice as many questions as the 24-child groups.

The data concerning repetition of questions is especially impressive. About 46 percent of the output of the 24-child groups were questions that had already been asked. When group size was reduced to 12, the percentage of repeated questions dropped to less than 16 percent of the total output. This percentage dropped to about eight when group size was reduced to six and to six when group size was reduced to four.

D. Discussion

In spite of the limitations imposed by the small number of groups and the prior creative experiences of the subjects, the main results of this study are rather impressive. Both the statistical data presented and the observations of the experimenters indicate quite strongly that so-called problems of inattention and short attention span among young children may possibly be avoided by small group instruction. This is in harmony with much group dynamics theory that there is less regressive behavior in small groups than in large groups or in individual situations. It is also in harmony with an observation made by Maya Pines (7) in reviewing the major current revolutionary programs of preprimary education. She maintained that one of the most important common characteristics of all of the preprimary programs that have had some success in providing disadvantaged children with the skills they need in school is that the teachers work with small groups or individual children and hardly ever with the class as a whole.

Because preprimary children are just beginning to achieve controls, such as attention, delaying response while another is talking, and the like, small group instruction probably makes more difference in preprimary education than at higher levels. Furthermore, since disadvantaged children apparently have more trouble than advantaged children in learning these controls, such methods are perhaps more important in instructing them than in instructing more advantaged children.

With the very great emphasis on individualization of instruction and attempts to make teaching-learning a one-to-one process, it might be well to give consideration to the possible superiority for certain purposes of small-group instruction over individual instruction. In the author's experience, from preprimary through graduate education, he has generally had greater success with small group instruction than with individual instruction.

E. Summary

The purpose of this study was to examine the effects of group size on the question asking behavior of eight classes of five-year-old children engaged in programs of preprimary educational stimulation.

In the test task, groups were asked to produce as many questions as they could in a 10-minute period concerning Mother Goose prints. It was required

that the questions be about things that could not be ascertained by looking at the picture. Groups of 24, 12, six, and four were studied.

It was found that group size had significant effects on number of different questions asked, number of discrepant event questions, and number of repeated questions. In most respects, four-child groups seemed to have little or no advantage over six-child groups.

In spite of the limitations of the study imposed by the sampling and design, the results support arguments for exploring the possible advantages of small group instruction over individual instruction in developing certain intellectual skills, such as question asking.

REFERENCES

1. BEREITER, C., & ENGLEMANN, S. Teaching Disadvantaged Children in the Preschool. Englewood Cliffs, N.J.: Prentice-Hall, 1966.
2. FORTSON, R. Reading readiness and beginning reading in the kindergarten. Mimeographed paper, Research and Development Center in Educational Stimulation, University of Georgia, Athens, Georgia, 1967.
3. ———. A creative-aesthetic approach to beginning skills in modern mathematics in the kindergarten. Mimeographed paper, Research and Development Center in Educational Stimulation, University of Georgia, Athens, Georgia, 1968.
4. GRAY, W., KLAUS, R. A., MILLER, J. O., & FORRESTER, B. J. Before First Grade. New York: Teachers Coll. Press, Columbia Univ., 1966.
5. HAMLIN, R., MUKERJI, R., & YONEMURA. Schools for Young Disadvantaged Children. New York: Teachers Coll. Press, Columbia Univ., 1966.
6. MONTESSORI, M. The Montessori Method. Cambridge, Mass.: Robert Bentley, 1964.
7. PINES, M. Revolution in Learning. New York: Harper & Row, 1967.
8. SANDERS, N. Classroom Questions. New York: Harper & Row, 1966.
9. SUCHMAN, R. J. Inquiry training: Building skills for autonomous discovery. *Merrill-Palmer Quart.*, 1961, **7**, 147-170.
10. TORRANCE, E. P. Guiding Creative Talent. Englewood Cliffs, N.J.: Prentice-Hall, 1962.
11. ———. Torrance Tests of Creative Thinking: Norms Technical Manual (res. ed.). Princeton, N.J.: Personnel Press, 1966.
12. YAMAMOTO, K. Development of ability to ask questions under specific testing conditions. *J. Genet. Psychol.*, 1962, **101**, 83-90.

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POLITICAL AND RELIGIOUS BELIEFS OF CATHOLICS AND ATTITUDES TOWARD LAY DRESS OF SISTERS*

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A. INTRODUCTION

Recent changes within the Roman Catholic Church have been visibly demonstrated by the adoption of lay dress for Sisters. Although this garb is regarded by some Catholics as a necessary symbol of the ascetic life, such clothing is only an accidental feature of religious expression. Thus, it is not surprising that this innovation has met with greater resistance from many lay Catholics than those who are pursuing a religious vocation (9, 10, 11).

Since the relationship between political and religious beliefs has been consistently established (2, 4, 6, 7, 8), it would seem that such attitudes should be reflected in opinions about changes in religious practices. The present study was designed to evaluate Catholic attitudes towards lay dress of Sisters and relate this to background factors such as age, sex, education level and political and religious beliefs.

B. METHOD

1. *Questionnaire*

The self-report questionnaire for this study consisted of 34 Likert-type items which offered six choices ranging from "strongly agree" to "strongly disagree." Among the statements, nine items were related to political opinion, nine items were concerned with traditional Catholic practices, and two items dealt with attitudes towards lay dress of Sisters. The remaining neutral statements pertained to personal habits and beliefs. Statements were randomly arranged in the questionnaire with the order of the choices reversed for every other item. A conservative-liberal political score and a traditional-progressive religious score was based on the sum of the nine responses associated with each category.

2. *Subjects*

Roman Catholic parishes from eight regions throughout the state of Massachusetts and the 10 largest Catholic colleges were the primary sources of

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*S*s. The final sample of 707 volunteers consisted of Catholic laymen residents of the state who were 18 years of age or older.

3. *Procedure*

Questionnaires were placed in prestamped, self-addressed envelopes and distributed either to Catholics during Sunday Church services or else given to college officials, who in turn randomly selected students. *S*s were instructed, "The envelope contains a questionnaire in regard to Sisters' Religious Habit. This is part of a statewide study of the lay Catholic opinion of the use of lay dress for Sisters. Please take it home, fill it in, and return it by mail in the enclosed envelope." The returns were scanned for invalid or incomplete responses and coded by a team of six seminary students.

Medians based on the entire sample were first determined for the political and religious scores. Individuals falling below the median were identified as conservative or traditional, while those above the median were designated liberal or progressive. The six possible choices for each of the statements related to lay dress of Sisters were reduced to two categories. *S*s who selected the alternatives strongly agrees, slightly agree, and agree were identified as agree, while those who selected strongly disagree, slightly disagree, or disagree were identified as disagree. For convenience of analysis, *S*s were classified into two age groups—18 to 29 years and 30 or over—and into two education levels—those with high school or less and those who have attended college or beyond.

C. RESULTS AND DISCUSSION

Table 1 summarizes the number and percent of *S*s identified as liberal or conservative in political beliefs and the distribution for other background variables. Whereas 56 percent of the *S*s who reported traditional religious beliefs also held conservative political beliefs, only 48 percent of the progressives were so classified. The significant result (chi square = 5.00, $p < .05$) supports the finding of previous studies (6, 7) of the association between traditional religious and conservative political beliefs. From Table 1 it may also be seen that males, as well as females, under 30 and those beyond a high school education were more likely to be liberal in political beliefs.

Since a large percentage of the younger *S*s were Catholic college students, it would seem that the present results support those reported by others (3, 5) that college has a liberalizing influence on political views. However, because the present sample was arbitrarily divided at the median into liberal and conservative, so that half the group were *de facto* defined as liberal, Lenski's conclusions (8) may still be true that Catholic education encourages conservative political views.

The significantly greater percentage of older males (chi square = 6.93, $p < .01$) and females (chi square = 15.07, $p < .001$) reporting conservative beliefs is consistent with the expectation that older people are more conservative. However, the present study was cross-sectional rather than longitudinal. Thus, it is still not clear if these results represent cultural differences between generations or changes within individuals from liberal to a more conservative position with increasing age.

TABLE 1

CONSERVATIVE-LIBERAL POLITICAL BELIEF AND BACKGROUND FACTORS

	Political belief				
	Conservative		Liberal		
Variable	*N*	%	*N*	%	Chi square
Religious belief					
traditional	203	56	157	44	5.00*
progressive	166	48	180	52	
Sex and age					
male, 18-29	78	42	108	58	6.93**
male, 30-over	51	60	34	40	
female, 18-29	116	46	137	54	15.07***
female, 30-over	112	65	59	35	
Sex and education					
male, high school	52	57	39	43	4.44*
male, college	77	43	103	57	
female, high school	108	63	64	37	7.14**
female, college	128	49	132	51	

* $p < .05$.
** $p < .01$.
*** $p < .001$.

The distribution for the traditional-progressive Religious Beliefs and background variables is presented in Table 2. A similar trend is apparent for the males and females in that those over 30 and those with at most a high school education are more likely to report traditional religious beliefs. The finding that age rather than sex is the important variable does not support the conclusion of Allport (1) that women are more concerned with religion than men. However, this study is not comparable to the present one for several reasons. Not only were all the *S*s Catholic but the items in the questionnaire

TABLE 2
TRADITIONAL-PROGRESSIVE RELIGIOUS BELIEF AND BACKGROUND FACTORS

	Religious belief				
	Traditional		Progressive		
Variable	*N*	%	*N*	%	Chi square
Sex and age					
male, 18-29	77	41	109	59	11.77***
male, 30-over	55	64	30	36	
female, 18-29	101	39	151	61	30.32***
female, 30-over	116	68	55	32	
Sex and education					
male, high school	56	62	35	38	8.27**
male, college	76	42	104	58	
female, high school	112	66	59	34	19.89***
female, college	112	43	148	57	

** $p < .01$.
*** $p < .001$.

sampled beliefs about ritual and custom rather than substantial theological issues and the pursuit of sanctity.

Results for the statement related to seeking help from a Sister wearing a traditional habit are presented in Table 3. While 61 percent of the *S*s who

TABLE 3
RESPONSE TO STATEMENT, "IF YOU WERE SEEKING HELP FROM A SISTER YOU WOULD PREFER TO DEAL WITH ONE WHO WEARS A TRADITIONAL HABIT."

	Response				
	Agree		Disagree		
Variable	*N*	%	*N*	%	Chi square
Political belief					
conservative	189	53	169	47	3.46
liberal	147	46	175	54	
Religious belief					
traditional	212	61	136	39	38.31***
progressive	123	37	208	63	
Sex and age					
male, 18-29	80	44	100	56	1.05
male, 30-over	43	51	41	49	
female, 18-29	112	46	130	54	3.34
female, 30-over	90	55	72	45	
Sex and education					
male, high school	47	52	43	48	1.74
male, college	76	44	98	56	
female, high school	100	63	65	37	10.22**
female, college	110	44	137	56	

** $p < .01$.
*** $p < .001$.

reported traditional religious beliefs also indicated a preference for dealing with Sisters who wore traditional clothing, only 37 percent of these identified as progressives reported this choice. This highly significant difference (chi square = 38.31, $p < .001$) would be expected if the *S*s maintained a cognitive consistency and if the Religious Belief scores were valid measures of this trait.

Perhaps the more interesting finding is the response to this statement and Political Belief scores. Fifty-three percent of those identified as conservative but only 46 percent of those identified as liberal indicated agreement. If a one-tailed hypothesis had been specified, this outcome would have been significant ($p < .05$), with the political conservatives more likely preferring Sisters in traditional religious habits.

A somewhat unexpected outcome in Table 3 is the distribution of responses to the statement and age and education level differences. Although females with no college level training favored traditional dress (chi square = 10.22, $p < .01$), this trend is not apparent for the males. Perhaps the older females with only high school training were responding to the statement on the basis of more limited experience with Sisters. On the other hand, many of the younger girls were attending Catholic colleges for women and thus had a greater opportunity to recognize the limitations of traditional dress and the arbitrary nature of such clothing.

Since Catholic males after leaving grammar school have relatively little personal contact with Sisters, it is understandable that they are similar in their response to the statement regardless of age or education level. However, it is interesting that the males responded in a progressive direction for this statement even though from Table 2 they appear no more progressive than the females for the same age. Perhaps females are more sensitive to the clothing issue than the males.

In Table 4 are summarized the responses to the statement concerning the use of lay dress for Sisters as a much needed innovation and the background variables. Although worded in a direction opposite from the previous statement, the same general trend is apparent. *S*s reporting traditional beliefs (chi square = 51.50, $p < .001$) and those with conservative political beliefs (chi square = 3.74) are less receptive to change. Males regardless of age or education level seem to favor this innovation, while females 30 and over (chi square = 15.10, $p < .001$) and with only a high school education (chi square = 3.57) are less interested in change.

Another finding of interest is the relative difference in the responses to the two statements concerning lay dress. In Table 4, it may be seen that 513 out of 704 or 73 percent of the *S*s indicated a need for innovation in clothing.

However, in Table 3 only 344 out of 680 or 51 percent of the *S*s indicated that they would prefer dealing with a Sister who wore lay dress. Thus, while Catholics in general may favor the abstract ideal of lay dress for Sisters, there is still some reluctance to accept the reality of this change as far as their own personal contact with Sisters is concerned.

TABLE 4

RESPONSE TO STATEMENT, "LAY DRESS FOR SISTERS IS A MUCH-NEEDED INNOVATION BECAUSE IT PERMITS THE SISTERS TO WORK WITHOUT THE LIMITATIONS OFTEN IMPOSED BY THE APPEARANCE OF THE RELIGIOUS HABIT."

	Response				
	Agree		Disagree		
Variable	*N*	%	*N*	%	Chi square
Political belief					
conservative	256	70	111	30	3.76
liberal	257	76	80	24	
Religious belief					
traditional	219	61	139	39	51.50***
progressive	294	86	51	14	
Sex and age					
male, 18-29	139	75	46	25	.06
male, 30-over	65	76	20	24	
female, 18-29	198	79	54	21	15.10***
female, 30-over	104	61	66	39	
Sex and education					
male, high school	67	74	24	26	.28
male, college	137	77	42	33	
female, high school	113	66	58	34	3.57
female, college	193	74	66	26	

*** $p < .001$.

D. SUMMARY

A sample of 707 lay Catholic residents of Massachusetts, 18 years of age or older, were given a Likert-type questionnaire measuring attitudes towards lay dress for Sisters, as well as conservative-liberal political and traditional-progressive religious beliefs. A significant association was observed for the group between conservative political and traditional religious beliefs. Males, as well as females, under 30 and with some education beyond a high school level were most likely to be liberal in political and progressive in religious beliefs. *S*s reporting traditional religious and conservative political beliefs were more likely to seek help from Sisters who wore traditional clothing and were less interested in Sisters adapting lay dress. Although a lower percentage of females 30 or older and those whose education level was high school or lower were willing to accept lay dress for Sisters; a similar trend was not observed for the males.

REFERENCES

1. ALLPORT, G. W., VERNON, P. E., & LINDZEY, G. A Study of Values (rev. ed.): Manual of Directions. Boston, Mass.: Houghton Mifflin, 1951.
2. ARGYLE, M. Religious Behavior. London, England: Routledge, 1958.
3. BROWN, D. G., & LOWE, W. L. Religious beliefs and personality characteristics of college students. *J. Soc. Psychol.,* 1951, **33**, 103-129.
4. CLARK, W. H. The Psychology of Religion. New York: Macmillan, 1958.
5. CLINE, V. B., & RICHARDS, J. M., JR. A factor-analytic study of religious belief and behavior. *J. Personal. & Soc. Psychol.,* 1965, **1**, 569-578.
6. EYSENCK, H. The Psychology of Politics. London, England: Routledge, 1954.
7. FERGUSON, L. W. Sociopsychological correlates of the primary attitude scales. I. Religionism II. Humanitarianism *J. Soc. Psychol.,* 1944, **19**, 81-98.
8. LENSKI, G. The Religious Factor. Garden City, N.J.: Doubleday, 1961.
9. MILLER, M. C. Attitude toward religious garb and its adaption. *Rev. for Relig.,* 1966, **25**, 438-444.
10. NOWLAN, E. H. The picture of the "Catholic" which emerges from attitude tests. *Lumen Vitae,* 1957, **12**, 275-285.
11. TENFEL, L. Religious habit: Some Sisters' comments. *Rev. for Relig.,* 1957, **16**, 3-9.

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PERSONALITY CORRELATIONS OF ADOLESCENT SELF-CONCEPTS AND SECURITY-INSECURITY*[1]

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A. INTRODUCTION

In personality theories, the concept of self has played an important role. In the late 1940's and 1950's, there was a great increase in the number, types, and varieties of psychological questionnaires, inventories, rating scales, checklists, and Q-sorts which purported to measure the self-concept of an individual or group. Wylie (6) has given a review and critical assessment of most of the instruments designed to assess self-concepts, self-esteem, or self-acceptance and related concepts. Worchel's (5) Self-Activity Inventory (critically appraised by Wylie) was developed to test the susceptibility of pilot candidates to failures under conditions of military stress. Worchel extended the use of the inventory to college students. In addition to situationally aroused conflicts, he emphasized that there are other conflicts which are aroused when the incoming experiences are inconsistent with the phenomenal self-structure of the individual.

Maslow's (3) theory of personality emphasizes the hierarchization of the motivation system. According to Maslow, there are a few basic needs which have ontogenetic priority and the gratification or frustration of which, during early years, is the basis for adult security or insecurity. The concept of security-insecurity is used by Maslow in the sense of psychological or emotional security-insecurity. The Security-Insecurity Inventory (S-I) (2) was designed to measure the feeling of security (almost equated with mental health). The inventory was made to measure only those symptoms of security which are characteristic of most or all insecure people. The S-I test measures a trait which is not perfectly constant but responds to some extent to moods, external traumatic events, and major life events, etc. The inventory is designed to reveal inner conscious feeling.

The adolescent period of life, as described by many psychologists, is de-

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picted to be full of rapid changes in physiological, emotional, and psychological aspects of development. In Western culture, the adolescent period is also considered to be a time of training and education for the young individual. The stresses and demands that may be made on the adolescents by their academic and social environments may make them feel emotionally insecure. If this is so, then it is worth investigating as to how pervasive an influence such feelings of emotional insecurity may have on various aspects of adolescent personality. It is further relevant to obtain the self-image of an adolescent as distinct from the ideal image, and examine how closely the former is related to certain personality variables as obtained from a self-report personality inventory checked by the same adolescent.

It is hypothesized that:

(*a*) The real-self descriptions would correlate significantly with personality variables as obtained from self-reports of the same *S*s. Such significant correlations may highlight personality areas which are of high concern to the *S*s in their awareness of their real-self.

(*b*) The ideal-self descriptions would not correlate significantly with ratings of personality variables obtained through self-reports of the same *S*s. If the ideal-self scores correlate significantly with ratings on personality scales, the relationship may be indicative of faking which is induced by social desirability in personality scales.

(*c*) The feelings of emotional-insecurity would have pervasive influence on large areas of personality variables.

B. METHOD

1. *Instruments*

For descriptions of real-self and ideal-self, Worchel's Self-Activity Inventory (S-A) was used. In order to obtain measures of emotional insecurity, Maslow's S-I Inventory (2) was utilized. Measures of personality variables were obtained through administration of Gough's California Psychological Inventory (CPI).

2. *Subjects*

Three hundred and twenty-eight freshman college students at the University of Manitoba participated in the investigation. The *S*s of this sample were drawn from various faculties of the University and, as such, formed a cross-section of the freshman class. There were 177 males (mean age 18.9 years), and 151 females (mean age 18.5 years).

3. *Investigative Procedure*

The *S*s who signed up for participation in the investigation were divided into two large groups and the CPI was administered in the standard way. The *S*s were asked to return for a second session two weeks later when the S-A and S-I inventories were administered according to instructions contained in the respective manuals of these inventories (1, 5, 2).

C. RESULTS

The data were machine-scored. Eighteen scale scores were obtained on the CPI for each *S*. A score of security-insecurity was generated from the S-I inventory for each *S* in addition to obtaining two scores on real-self and ideal-self per *S* from the S-A inventory. Correlation coefficients were calculated between S-I measures and CPI scales, as well as between S-A scores and CPI scales for the males and females separately. Table 1 presents the correlation coefficients between the relevant variables. The two correlation matrices of 21 × 21 variables were factor analyzed by the principal components method. Using the eigenvalue of 1.0 as a cut-off point, six factors were retained and rotated orthogonally by the Varimax Criterion. The six factors accounted for 73.12 and 71.21 percent of total variance in the male and female samples respectively. Five of the factors were highly similar to the factors obtained in a previous factor-analytic study (4) of the CPI scales. The sixth factor appeared as a unique dimension in both the male and female groups. The variable which composed the unique dimension consisted of ideal-self with loadings of .96 and .89 respectively in the male and female samples. The variable of ideal-self showed near zero loadings on all other factors.

D. DISCUSSION

As can be seen in Table 1, real-self variables correlated significantly with a large number of personality variables in both samples. There were 11 and eight significant correlations between real-self and personality traits of the males and females respectively. A closer examination reveals that three personality areas which were of greatest concern to the males and females were Self-control (Sc), Tolerance (To), and Good Impression (Gi); in addition females showed a great deal of concern with Achievement via Conformance (Ac). It is interesting to note that in factor analysis, the real-self variable appeared with a loading of .87 (the highest on that factor) along with the two personality variables Sc (.52) and Gi (.53), as well as S-I (.54), and was labelled accordingly as the Social Insecurity factor in the case of the males. The factor analysis of the female correlation matrix showed that the real-self variable appeared with a loading of .79 along with five other personality variables: Sense of Well-being (.42), Self-control (.68), Tolerance (.44), Good Impression (.76), and Achievement via Conformance (.55). Since a cut-off point of ±.40 was used to select variables best descriptive of a particular factor, the S-I failed to meet this criterion in the female sample. The factor was labelled, accordingly, Social Impression in the female group. The real-self variable showed negligible loadings on all other factors of both matrices.

TABLE 1
CORRELATION COEFFICIENTS

CPI Scales[a]	Security-Insecurity		Ideal-Self		Real-Self	
	M	F	M	F	M	F
1. Do	−36***[b]	−42***	−10	−10	−20*	−17
2. Cs	−38***	−35***	−12	−06	−24*	−30**
3. Sy	−50***	−54***	−04	−11	−29**	−27**
4. Sp	−48***	−36***	01	−08	−20*	−16
5. Sa	−19	−25***	−03	−03	−08	−08
6. Wb	−54***	−46***	−03	−15	−32**	−27**
7. Re	−31**	−30**	−14	−04	−12	−15
8. So	−44***	−36***	−02	−06	−18	−15
9. Sc	−43***	−35***	−12	−17	−43***	−39***
10. To	−51***	−43***	−12	−14	−34***	−33***
11. Gi	−35***	−43***	−13	−14	−39***	−49***
12. Cm	−25*	−13	02	−00	02	−09
13. Ac	−45***	−47***	−10	−06	−23*	−39***
14. Ai	−25*	−19	−09	−14	−19	−15
15. Ie	−43***	−42***	−07	−11	−30**	−15
16. Py	−25*	−23*	−02	−13	−25*	−24*
17. Fx	−04	14	−03	−12	−02	08
18. Fe	15	03	−03	07	06	−04
Grand Mean:	25.30	24.96	100.33	97.65	139.45	140.52
Grand S.D.:	15.17	12.80	16.80	12.03	20.18	17.80

[a] 1. Do—Dominance; 2. Cs—Capacity for Status; 3. Sy—Sociability; 4. Sp—Social Presence; 5. Sa—Self-acceptance; 6. Wb—Sense of Well-being; 7. Re—Responsibility; 8. So—Socialization; 9. Sc—Self-control; 10. To—Tolerance; 11. Gi—Good Impression; 12. Cm—Communality; 13. Ac—Achievement by Conformity; 14. Ai—Achievement by Independence; 15. Ie—Intellectual Efficiency; 16. Py—Psychological Mindedness; 17. Fx—Flexibility; 18. Fe—Femininity.

[b] Decimal points have been omitted (e.g., −.36).

* Significant at <.05 level.

** Significant at <.01 level.

*** Significant at <.001 level.

As mentioned in a previous study (4), the five CPI factors were labelled Person Orientation (PO), Value Orientation (VO), Flexibility (Fx), Communality (Cm), and Femininity (Fe). The PO and VO factors were common factors; the rest were specific factors. In the present factor-analytic study, PO, VO, Fx, and Fe appeared highly similar to the corresponding factors in the study mentioned previously. The sixth factor (described earlier), labelled as Ideal-Self, was unique and not correlated with any of the other personality variables. As such, the hypotheses (a) and (b) are well substantiated.

The S-I variable showed significant correlations on 15 and 14 personality variables of the respective male and female correlation matrices. Thus, the influence of emotional insecurity tends to be widespread and pervasive on personality traits. In the factor analytic studies of the male, the S-I variable appeared with loadings of .47 and .54 on the VO and Social Insecurity factors; it also appeared in the PO factor (.35) but failed to meet the criterion. In the female Varimax matrix, the S-I variable failed to meet the criterion; nevertheless, the variable appeared in four of the factors with loadings of .36, .38, .33, and .38. This difference between the male and female matrices may be indicative of the fact that certain personality areas are much more susceptible to feelings of insecurity in the males studied than in the females. On the other hand, a larger number of personality factors appear to be susceptible to influences of emotional insecurity in the females than in the males. A fine-grained analysis of these differences between males and females with respect to the influences of emotional insecurity on personality traits may provide increased insights into the possible reasons for the differences noted.

E. SUMMARY

Three hundred and twenty-eight college freshmen described their real-self and ideal-self images using Worchel's S-A test. The CPI and Maslow's S-I were also administered to the group. The scores obtained on the three inventories were intercorrelated for the males and females separately. The correlation matrices of 21 × 21 scores were factor analyzed. The results indicated that real-self measures were significantly correlated with certain personality variables: e.g., Self-control, Tolerance, and Good Impression. The ideal-self measures did not correlate significantly with any of the personality variables, whereas the S-I measures showed significant correlation with the majority of personality variables. The factor analyses crystallized these interrelations through factor loadings of S-I and S-A variables on different factors of the CPI scales. The three hypotheses were thereby substantiated.

REFERENCES

1. GOUGH, H. G. Manual for the California Personality Inventory (Revised). Palo Alto, Calif.: Consulting Psychologists Press, 1964.
2. MASLOW, A. H. Manual for the Security-Insecurity Inventory. Palo Alto, Calif.: Consulting Psychologists Press, 1952.
3. ———. Motivation and Personality. New York: Harper & Brothers, 1954.
4. SCHLUDERMANN, S., & SCHLUDERMANN, E. Generalizability of California Personality Inventory Factors. *J. of Psychol.*, 1970, **74**, 43-50.
5. WORCHEL, P. Adaptability-screening of flying personnel: development of a self-concept inventory for predicting maladjustment. Report No. 56-62, U.S.A.F., School of Aviation Medicine, Randolph Air Force Base, Texas, 1957.
6. WYLIE, R. C. The Self-Concept: A Critical Survey of Pertinent Research Literature. Lincoln, Neb.: Univ. Nebraska Press, 1961.

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THE USE OF A VOLTAGE CONTROLLED OSCILLATOR AS AN ANALOG TO DIGITAL CONVERTER*

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A. INTRODUCTION

The output of the typical recording device (polygraph, voltmeter, etc.) is an analog voltage. This demands that experimental data must be laboriously measured in terms of pen excursions or read from a dial and recorded. This cost in time, efficiency, and accuracy can be cut through the use of an analog to digital (A-D) converter. Unfortunately this piece of apparatus may not be available to the experimenter. The purpose of this paper is to explain how an A-D converter system may be assembled, using, as its basis, a piece of apparatus that is available in many laboratories—a voltage controlled oscillator (VCO). The VCO is a sweep oscillator, whose sweep rate can be controlled by an external voltage. A major advantage of this system is its versatility, since the VCO can be used in other experiments as a flexible source of auditory output.

The basic operation of the system is extremely simple. The analog data output is used to sweep the VCO, the output of which is converted to digital pulses by means of a Schmitt Trigger (ST). Absolute calibration of the number of output pulses can be obtained with the use of a typical analog voltmeter on the voltage input to the VCO, or relative calibration can be used to correlate the number of pulses to some physical movement (distance between two points, degrees of rotation, etc.). By means of digital logic, static and dynamic data can easily be obtained. An example of static data is the size of a comparison stimulus in a size constancy experiment; while an example of dynamic data would be the total degree of eye movements during some period of time, as measured at predetermined intervals. The length of the sampling period could coincide with the rate of sampling so that virtually no information is lost.

B. APPARATUS

1. *Sweep Oscillator*

The VCO was a Spectral Dynamics Corporation, Model SD 104-5 sweep oscillator. The output of the oscillator is proportionate to voltages in the

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range of 10 mV to 10 V. This range is suitable for many experiments, but an auxiliary amplifier may be used on extremely low level signals.

2. *Logic Circuitry*

The digital logic that has been used in this system was solid state modules manufactured by BRS electronics (series 200). Figure 1 is a block diagram of the logic program. Two possible experimental situations are contained within the dotted-line portions of the program. Under situation A, *E* wishes to determine a value associated with *S*'s static response (e.g., the judged size of some stimulus). By closing a switch, CX_1 (a pulse former) fires OS_1 (a one shot), which enables one leg of AG_1 (an AND gate) and MV_1 (a multivibrator). The second leg of AG_1 is enabled by the VCO through the ST. The output pulses of AG_1 are fed into a recording device (paper tape, print out counter, etc.). Thus the number of pulses recorded is a function of the signal to the VCO and the duration of adjustable OS_1. The pulses of MV_1,

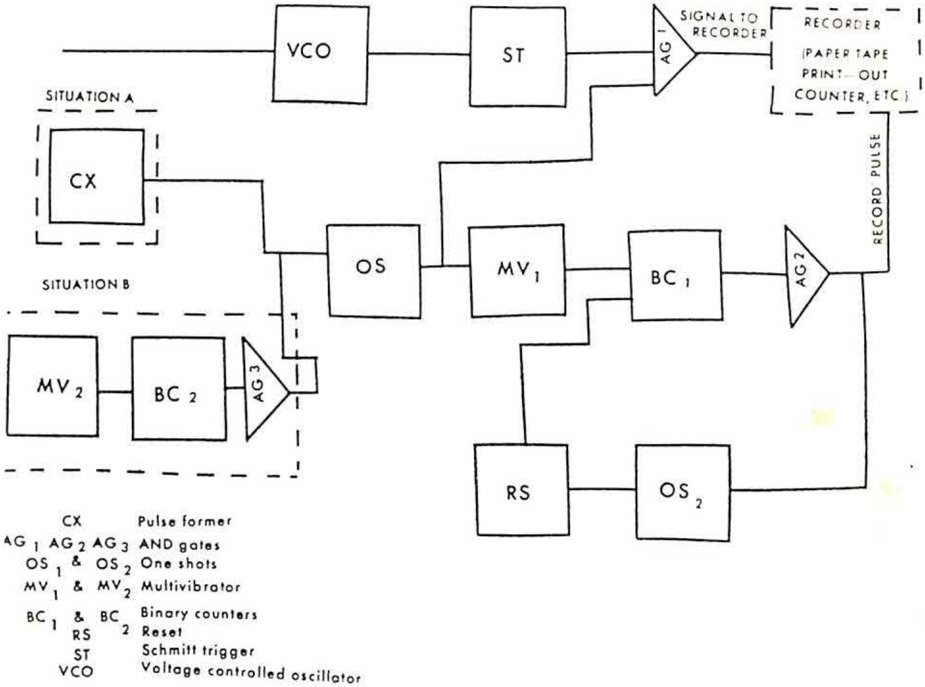

FIGURE 1
BLOCK DIAGRAM OF LOGIC PROGRAM TO OBTAIN STATIC AND DYNAMIC DIGITAL DATA

enabled by OS_1, are stored in BC_1 (a binary counter), and, at some predetermined count, a decoding AND gate (AG_2) provides the "record" command (punch, print, etc.) to the recording device. A second output of AG_2 fires OS_2 which, in turn, fires RS (a reset unit), resetting BC_1. The time base of data sampling from the VCO is a function of OS_1, MV_1, and BC_1, any or all of which may be adjusted to virtually any value.

The logic is virtually the same under situation B, except that the output of the VCO is constantly sampled at predetermined intervals. The pulses of free-running MV_2 are stored in BC_2 and, at a predetermined count, decoding AG_3 fires OS_1. This time base can be controlled by varying the frequency of MV_2 and the predetermined count of BC_2. For example, MV_2 is pulsing at 1000CPS and BC_2 will fire AG_3 when 100 pulses have been recorded—every .1 second. If BC_2 fires AG_3 when 10 pulses are recorded, the time base is .01 second. The length of signal sampling (as determined by BC_1), of course, must not be longer than the rate of signal sampling (as determined by BC_2).

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MANIFEST ANXIETY AND LOCUS OF CONTROL OF LOW-ACHIEVING COLLEGE MALES*

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A. INTRODUCTION

Measures of general anxiety have been found to be related to certain broader personality tendencies. For example, the heightened insecurity of high anxious individuals has been found to result in greater susceptibility to persuasion and opinion change (3). Moreover, Steiner and Vannoy (14) found that the Manifest Anxiety Scale (MAS) was positively correlated with conformity that persisted in the absence of social pressure. Significant relationships have also been reported between the MAS and clinical measures of anxiety (7).

Although some researchers have obtained negative relationships between general anxiety and intellectual performance (13), others have reported nonsignificant correlations (6, 11).

More recently, the MAS has been related to conflict over aggression (9), semantic differential ratings (8), and to susceptibility to the Mueller-Lyer illusion (12).

The primary purpose of this study was to examine whether there were significant differences in manifest anxiety among three groups of low-achieving college freshmen differing in locus of control of reinforcement. Exploration of the usefulness of a three-way classification of locus of control (external, internal-external, and internal) represented a second focus of this investigation.

B. PROCEDURES

1. *Subjects*

The subjects for this study were 60 freshman males at the University of North Dakota who at the end of their first semester had less than a 2.0 (C) grade point average. Three groups of 20 subjects, operationally defined with respect to locus of control as external (E), internal-external (I-E), or internal (I), were derived.

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2. *Design*

Out of a total of 711 freshman males enrolled during the 1967-68 academic year, 259 students who had a GPA of less than 2.0 were invited to participate in the study. The 155 students who voluntarily reported to the Counseling Center were administered the Heineman Forced-Choice Anxiety Scale. Scores on the I-E Scale were available for these subjects, since the I-E Scale had been routinely administered as part of the freshman orientation activities. The research population was randomly selected from the 155 volunteers to comprise three groups: namely, 20 externals, 20 internal-externals, and 20 internals.

The external locus of control group consisted of students having scores one *SD* above the mean of 39.23. Scores 48 and above were included in this category. The internal-external locus of control group consisted of students having scores within one-third of an *SD* (36 to 47). The internal locus of control group was comprised of students scoring one *SD* below the mean—i.e., below 33.

Since the data obtained in this investigation were of the interval type, parametric statistics were used. The level of significance demanded for rejecting the null hypotheses was $p < .05$.

3. *Instruments*

Heineman (4) developed a forced-choice form of the Taylor Manifest Anxiety Scale in which each item consists of three statements: *viz.,* an anxiety statement and a nonanxiety statement of comparable social favorability, and an additional nonanxiety statement differing in social favorability from the two matched statements.

An inventory which included 50 forced-choice blocks that incorporated the Taylor MAS items was administered to the subjects. The subjects were required to choose one statement in each triad as most descriptive of themselves, and one statement as least descriptive. Scores were assigned according to the designation of the anxiety statement as most descriptive or least descriptive relative to the two nonanxiety statements. The possible range of scores was 100. A Kuder-Richardson reliability coefficient of .85 was reported for the forced-choice scale (4).

The I-E Scale was developed within the framework of Rotter's social learning theory (10). It provides a measure of the extent to which a person perceives events as determined by factors extrinsic to himself: for example, fate, chance, and the manipulation of others (external control) *versus* the extent to which the individual perceives events as determined by factors intrinsic to himself (internal control). Only the even-numbered items are scored; odd-numbered items are fillers.

The possible range of scores on the I-E Scale is 90. For college populations the mean and *SD* were 37 and 12, respectively. The scale is scored in the direction of external control; i.e., the higher scores reflect an external orientation. Split-half reliabilities ranging from .84 to .96 have been obtained and test-retest reliabilities ranging from .71 (one year) to .86 (three months) have been reported (5).

C. RESULTS

The mean anxiety scores and the standard deviations for low-achieving freshman males identified as E, I-E, or I are reported in Table 1.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF ANXIETY SCORES FOR THREE GROUPS OF LOW-ACHIEVING MALES

Criterion group	*N*	*M*	*SD*
External (E)	20	56.30	6.27
Internal-External (I-E)	20	50.05	9.57
Internal (I)	20	45.15	12.13

The range of anxiety scores for the internals was 23 to 68. For the internal-externals, the range was 38 to 80, whereas the range for the externals was 36 to 75. For the low-achieving freshman males categorized as having an external locus of control, a mean anxiety score of 56.30 was obtained. The students characterized as having an internal locus of control had a mean of 45.15. Considerably more variability was noted in the anxiety scores for the internals than for the externals.

An analysis of variance was performed to ascertain whether the observed differences in anxiety were significant. It may be noted from the data presented in Table 2 that external, internal-external, and internal low-achieving male freshmen differed significantly at the .01 level ($F = 6.40$).

The analysis of variance was followed by the multiple comparisons among means test. The externals among low-achieving freshman males differed significantly ($p < .01$) from the internals. A critical difference "d" of 9.55 was necessary for significance at this level. The difference in anxiety levels between the externals and the internal-externals was not significant. Furthermore, a nonsignificant difference in anxiety was obtained in the comparison of internal-externals and internals. These findings suggest that a three-way classification of locus of control is not to be preferred to the more conventional two-way classification: i.e., external and internal.

As noted from the data reported in Tables 3 and 4, the three groups of low-achieving males identified as E, I-E, or I were not significantly different in academic potential, as measured by the obtained composite scores on the American College Test (ACT). For the externals, the scores ranged from 16 to 28; for the internal-externals, 12 to 28; for the internals, 14 to 28. The mean ACT composite score for the three groups was 22 ($N = 60$). The American College Testing Program (1) has reported a mean of 22.1 ($SD = 4.5$) for freshmen enrolled at 38 institutions granting the doctorate. It would appear that factors other than academic potential accounted for the low achievement among freshman males identified as E, I-E, or I.

TABLE 2
ANALYSIS OF VARIANCE OF ANXIETY SCORES
FOR THREE CRITERION GROUPS

Source	*df*	SS	MS	*F*
Treatments	2	1249.19	624.59	6.40*
Within groups	57	5565.81	97.64	
Total	59	6815.00		

* $p < .01$.

TABLE 3
MEANS AND STANDARD DEVIATIONS OF COMPOSITE ACT
SCORES FOR THREE GROUPS OF LOW-ACHIEVING MALES

Criterion group	*N*	*M*	*SD*
External (E)	20	21.50	3.33
Internal-External (I-E)	20	21.00	5.23
Internal (I)	20	22.70	3.53

TABLE 4
ANALYSIS OF VARIANCE OF ACT COMPOSITE
SCORES FOR THREE CRITERION GROUPS

Source	*df*	SS	MS	*F*
Treatments	2	15.59	7.79	.43 (NS)
Within groups	57	1020.41	17.90	
Total	59	1036.00		

D. DISCUSSION

Significant differences in anxiety were found among low-achieving freshman males identified as E, I-E, or I. Students who were external in locus of control had a significantly higher level of anxiety than did students who were either internal-external or internal in locus of control.

Externals have been characterized as more conforming and less confident than internals. The externals have a lower expectation of success and a lesser degree of self-confidence which leads to avoidance behavior. The internals, on the other hand, are more capable of creating a favorable impression, and are concerned about how others react to them. They tend to be more cooperative, more enterprising, and more diligent. Internals are more reactive to cues and reinforcements in a learning situation, and show more overt striving for achievement (10).

The attitudes of externals comprise a defense against failure. Externals are more inhibited, wary, resentful, and self-centered, and exhibit little concern for the needs and interests of others. Externals can further be characterized as confused, cautious, and stereotyped in thinking; lacking in self-direction and self-discipline; and, as reported in this study, more anxious. In this connection, it should also be noted that high anxious subjects have been found to be more authoritarian (2).

E. SUMMARY

This study investigated the level of manifest anxiety of 60 low-achieving male college freshmen differing in locus of control. Twenty subjects who were external in locus of control were significantly more anxious ($p = .01$) than were subjects who were internal ($N = 20$). The difference in anxiety between the externals and the internal-externals ($N = 20$) was not significant, nor was significance obtained in the comparison of internal-externals and internals. A forced-choice form of the Taylor MAS was used. It was found that a three-way classification of locus of control was not superior to the more conventional external and internal categories of locus of control.

It would be interesting to study the effects upon later college achievement of counseling services rendered to college freshmen differing in level of manifest anxiety and locus of control. It is hypothesized that college students who are "internal" will respond more favorably to counseling.

REFERENCES

1. AMERICAN COLLEGE TESTING PROGRAM. Using ACT on the campus. Iowa City, Iowa: American College Testing Program, 1968.

2. Bendig, A. W., & Hountras, P. T. Anxiety, authoritarianism, and student attitude toward departmental control of college instruction. *J. Educ. Psychol.*, 1959, **50**, 1-7.
3. Fine, B. J. Conclusion-drawing, communication, credibility, and anxiety as factors in opinion change. *J. Abn. & Soc. Psychol.*, 1957, **54**, 369-374.
4. Heineman, C. E. A forced-choice form of the Taylor anxiety scale. *J. Consult. Psychol.*, 1953, **17**, 447-454.
5. Jackson, D. N., & Bloomberg, R. Anxiety: Unitas or multiplex? *J. Consult. Psychol.*, 1958, **22**, 225.
6. James, W. H., & Randall, H. The conditioning of meaning as a function of internal control and drive level. Paper presented at the meeting of the Midwestern Psychological Association, Chicago, May, 1966.
7. Lauterbach, C. G. The Taylor A scale and clinical measures of anxiety. *J. Consult. Psychol.*, 1958, **22**, 314.
8. Mueller, W. J. Anxiety level, inferred identification and response tendencies on a semantic differential. *J. Counsel. Psychol.*, 1966, **13**, 144-152.
9. Mueller, W. J., & Grater, H. A. Aggression conflict, anxiety, and ego strength. *J. Consult. Psychol.*, 1965, **29**, 130-134.
10. Rotter, J. B. Generalized expectancies for internal *versus* external control of reinforcement. *Psychol. Monog.*, 1966, **80** (4, Whole No. 609).
11. Sarason, I. G. The relationship of anxiety and "lack of defensiveness" to intellectual performance. *J. Consult. Psychol.*, 1956, **20**, 220-222.
12. Sinha, A. K. P., & Sinha, S. N. Mueller-Lyer illusion in subjects high and low in anxiety. *Percept. & Motor Skills*, 1967, **24**, 194.
13. Spielberger, C. D. On the relationship between manifest anxiety and intelligence. *J. Consult. Psychol.*, 1958, **22**, 220-224.
14. Steiner, I. D., & Vannoy, J. S. Personality correlates of two types of conformity behavior. *J. Personal. & Soc. Psychol.*, 1966, **4**, 307-315.

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THE DAY OF FREUD'S DEATH: A THIRTIETH ANNIVERSARY NOTE*

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Students of *The Interpretation of Dreams* (3) suspected very early that the death of a sibling in Freud's childhood played an important part in his dreams and in his neurosis. This implication is particularly evident in the *non vixit* dream which revolves around a series of rivals whom the dreamer has happily outlived. The earliest of these competitors was his infant brother Julius (Hebrew name probably Joseph); the latest of them, Freud's contemporary friend Wilhelm Fliess who unwittingly became the "analyst" of the famous "self-analysis." On a "transference" basis Fliess served as the last revenant of that earliest sibling. In a letter dated September 21, 1899, which Freud wrote to his willy-nilly analyst, this interpretation is coyly suggested: "In the *non vixit* dream I find I am delighted to have survived you" (2, p. 299).

In his biography of Freud, Jones (5, vol. I, pp. 7-8) indicates the psychological influence of the event: Freud was left with an enduring sense of self-reproach for death wishes that he had entertained out of jealousy. The biographer supportively cites Freud's own avowal to this effect in a letter to Fliess during 1897 (2, p. 219). The point is more fully developed in a work by Zilboorg (6, *passim*) concerned with Freud's orientation to religion, but even here its broader significance is not discussed. Most recently Grinstein (4) has referred to this experience in extending Freud's associations to several of the classic dreams but, again, it is not treated in clear focus or in full perspective.

As tending to reinforce the presumptive effect of this formative experience, it is important to note that Jones (and others after him) has assigned to Freud at the time of this event an earlier age than is, in fact, correct. Jones states that the sibling died at the age of eight months when Sigmund was 19 months old. From a copy of the death certificate in the writer's possession, it is confirmed that Julius died on April 15, 1858 at age six months; Sigmund, born May 6, 1856, was then 23 months and one week old—practically two years.

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Though the ramifications of the topic will not be dealt with here, a cognate biographical fact, in which this Note centers, deserves at long last to be put on record. The fact is that Freud died on the Day of Atonement (September 23, 1939). Moreover, as a scrutiny of the biography by Jones (5, vol. III, p. 246) reveals, Freud elected to die at that very time.[1] Idiodynamically—i.e., in terms of Freud's own theory as applied to himself—one must conclude that his burden of guilt was lifelong and that his death on this day was no accident. The early fate of his brother Julius was a trauma that informed the nucleus of a severe neurosis, and the neurosis entailed the therapeutically creative self-analysis. In the course of that ordeal Freud ruminated, "You owe a death to Nature"—quoting Shakespeare and Sterne, with "Nature" substituted for "God." But his unconscious determined that the debt be paid on the most solemn of God's days—the Day of Atonement.

That this factual coincidence has passed without published notice for 30 years is itself a fact of some interest.[2] The circumstances are noteworthy. The contemporary newspaper accounts on Sunday, September 24, stated that Freud died shortly before midnight on the 23d. Moreover, in the standard biography many years later Jones (5, vol. III, p. 246) repeated that statement. Only in the British edition of the *Letters of Sigmund Freud* [(1, p. 456), but not in the American edition of the same book which appeared earlier] did the editor, Freud's son Ernst, definitively state: "During the night of September 22-23, at 3:00 a.m. . . . Freud died." A discrepancy of 20 hours is thus introduced. According to the first accounts, the death occurred at the close of September 23—i.e., shortly before midnight—whereas, according to the final statement, it happened at the beginning of the same day—i.e., shortly after midnight of the 22d.

One naturally wonders about this discrepancy. It is clear that Freud (who died of cancer) was in a coma for 24 hours after receiving injections of morphine (at his own request) on the morning of the 22d (5, vol. III, pp. 246, 495). From these data the time of death would, indeed, be at about 3:00 a.m. on the 23d. But, one then asks, why did the newspapers on the 24th incorrectly report that the death had occurred shortly before midnight on the 23d? Only one hypothesis seems to fit the known facts. If the decease of this worldrenowned figure at 3:00 a.m. of the 23d had been reported to the news media promptly, the account would have been published on Saturday, September 23, the Day of Atonement. The association between the holiday and the demise would then have been too proximate to have escaped notice.

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[1] Massive (statistical) evidence for such elections, which some may be inclined to question, is provided in a recent sociological study by David Phillips on dates of death, reported in *Time,* September 5, 1969.

[2] Even at the possible price of paramnesia, the writer wishes to record the recollection that shortly after Freud's death Dr. Lionel Goitein and he in a conversation of some levity speculated about the proximity of the demise with the Day of Atonement. At that time, however, the context which gives this Note point was not available.

CONCLUSION AND SUMMARY

In the context of Freud's nuclear neurotic complex, cognizance is taken of the fact that he died on Yom Kippur, the Day of Atonement (September 23, 1939). The death of his brother Julius at the age of six months when Sigmund was 23 months old was a traumatic event which left an ineradicable sense of guilt. From this nucleus emerged a neurosis that entailed the therapeutically creative self-analysis in the late 1890's, with which psychoanalysis had its inception. In terms of Freud's own theory the coincidence between the holiday and the demise was restitutively and psychically determined, particularly since there is clear evidence that he had a significant conscious part in electing the time of his death. That the coincidence has not previously been noted is discussed in terms of a discrepancy of 20 hours between the time of death announced in 1939 and the later hour definitively stated for the first time in 1961.

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REFERENCES

1. FREUD, S. Letters 1873-1939 (ed. by E. L. Freud; trans. by T. & J. Stern). London, England: Hogarth, 1961.
2. ———. The Origins of Psycho-Analysis: Letters to William Fliess, Drafts and Notes: 1887-1902 (ed. by M. Bonaparte, A. Freud, & E. Kris; auth. trans. by E. Mosbacher & J. Strachey). London, England: Imago, 1954.
3. ———. The Interpretation of Dreams (1899). In J. J. Strachey (Ed.), *The Standard Edition of the Complete Psychological Works of Sigmund Freud (Vols. 4-5)*. London, England: Hogarth, 1953.
4. GRINSTEIN, A. On Sigmund Freud's Dreams. Detroit, Mich.: Wayne Univ. Press, 1968.
5. JONES, E. The Life and Work of Sigmund Freud (Vols. I-III). New York: Basic Books, 1953-1957.
6. ZILBOORG, G. Psychoanalysis and Religion (ed. by M. S. Zilboorg). New York: Farrar, Straus, & Cudahy, 1962.

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PERCEIVED ATTRACTIVENESS OF SOCIAL STIMULI AS RELATED TO THEIR PERCEIVED SIMILARITY TO SELF*[1]

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A. PROBLEM

Newcomb (5, 6, 7) and others (1, 2, 3, 8, 9, 11, 12) have reported finding positive relationships between perceived similarity to self (PSS) and perceived attractiveness (PA). Reviews of the problem have been published by Lott and Lott (4) and by Thibaut and Kelley (13).

Previous studies have generally used verbal materials as a means of assessing PSS, although a few studies have employed limited numbers of photographs to be rated or chosen in terms of some stated dimension or characteristic. Moreover, previous studies have not usually provided findings for individual *S*s, although they have yielded group results. The present study has used a relatively large number of photographs to be *Q* sorted according to PA and according to PSS; it has required a minimum of verbalization or use of verbal concepts by *S*s; and results have been analyzed and interpreted for individual *S*s as well as for groups.[2]

The following hypotheses were tested in the present study: (*a*) that, for individual *S*s, the degree of PSS will be positively correlated with the degree of PA; (*b*) that, if within-group consensus occurs on the relative degree of PA across different photographs, there will be a corresponding within-group consensus on the relative degree of PSS; (*c*) that, if the second hypothesis is confirmed, there will be across-group agreement (positive correlation) between group medians on PA and between group medians on PSS; and (*d*)

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[1] This is a revision of "Relationship between liking for social stimuli and their perceived similarity to self," which was presented at the 1968 meeting of the Midwestern Psychological Association.

[2] It is, however, important to note that studies of the relationship between PA and PSS, including the present study, have mainly used Anglo-American college-student subjects. Whether similar findings would occur in other cultural settings remains to be tested. The procedures of the present study could, with minor modifications, be adapted to cross-cultural studies of the relationship between PA and PSS.

that, if the second hypothesis is confirmed, within-group medians on relative degree of PA will correlate positively with medians on relative degree of PSS.

B. METHOD

1. *Social Stimuli*

The social stimuli used in the present study consisted of a set of 60 facial photographs of college-age males, which have been described in a previous paper (10). The photographs were taken in a standard manner that controlled many different stimulus variables. Since the data for the present study were collected eight years after the photographs had been taken, it was thought unlikely that the photographs would be recognized by any of the student *S*s. In the rare cases when *S*s indicated such recognition of any of the photographs, the data for these *S*s were excluded from the study.

2. *General Procedure*

Each *S* was instructed, individually, to *Q* sort the set of 60 photographs, along an 11-category scale, with frequencies of 1, 2, 4, 7, 10, 12, 10, 7, 4, 2, and 1, under two different conditions, in two different sessions separated by an interval of approximately two weeks. The instructions were typewritten and were read by the *S* rather than being presented orally. Cardboard patterns were provided, with 11 segments indicating the number of photographs to be sorted into each group and with appropriate labels for the extreme ends and the middle of the scale. Before presentation to any given *S*, for sorting, the set of photographs was arranged according to a numerical order that had been randomly assigned to the photographs. Approximately half of the *S*s (three of the groups used) performed the PA *Q* sorts during the first session and the PSS *Q* sorts during the second session; the remaining *S*s (the remaining three groups) were recruited in a later academic quarter and performed the two *Q* sorts in the reverse order. All *S*s in a given academic quarter completed the first *Q* sort before any *S*s were given the second *Q* sort, to prevent the possibility that knowledge about the nature of the second *Q* sort would influence results of the first *Q* sort.

3. *Instructions*

In addition to detailed instructions (constant for all *Q* sorts) concerning the *Q*-sort procedure to be followed, three instructional conditions were provided, one for PSS and two for PA. For the PSS *Q* sort, instructions for all *S*s of both sexes were stated as follows: "We would like you to sort the sixty photographs into eleven different groups, according to how much the faces seem to be *similar to yourself. 'Similar to yourself'* means similar to yourself in *personality* or in some *personality characteristic.*" All male *S*s and the F-1-1 and F-1-2 groups of female *S*s were given the following instructions for the PA *Q* sort: "We would like you to sort the sixty photographs into eleven different groups, according to *how much you like* the faces shown. 'Like' means *to like socially,* as you would like a friend." Female *S*s of the F-2-1 and F-2-2 groups were given the following instructions for the PA *Q* sort: "We would like you to sort the sixty photographs into eleven different groups, according to *how much you like* the faces shown. 'Like' means *to be personally attracted,* as in the case of somebody you would like to have as a *boyfriend* or as a possible *future husband.*"

4. *Subjects*

The *S*s consisted of six groups of students recruited from introductory psychology classes in the Spring, Summer, and Autumn quarters of 1966. Groups M-1-1 (33 males), F-1-1 (29 females), and F-2-1 (29 females) performed the PA *Q* sort first; groups M-1-2 (31 males), F-1-2 (26 females), and F-2-2 (31 females) performed the PA *Q* sort second.[3]

C. RESULTS

1. *Findings for Individual* Ss

To test the first hypothesis, a Pearson r was computed for each individual *S,* to determine the extent of agreement between the *S*'s two sets of *Q*-sort scores (PA *versus* PSS). The distributions of individual r's, for the six groups, are presented in Table 1. The median values of the r's (last row, Table 1) varied from .65 to .76 ($p < .01$). As shown in the next-to-last row of Table 1, 32 of 33 r's, 29 of 31 r's, 26 of 29 r's, 23 of 26 r's, 28 of 29 r's, and 30 of 31 r's were significantly positive at or beyond the .01 level of confidence ($r \geqslant .33$). Thus, the findings for all but 11 of 179 *S*s confirmed the prediction that, for individual *S*s, PA would be positively related to PSS. Although the data do not provide information concerning the basis for failure of the 11 exceptional *S*s to conform to the hypothesis, it is reasonable to expect that this small number of *S*s could have performed one or both of their *Q* sorts with a minimum degree of involvement.

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[3] The final digit in the group designation indicates the order of occurrence of the PA *Q* sort; the middle digit indicates the nature of the PA instructions (1: ". . . to like socially. . . . "; 2: ". . . to be personally attracted. . . .").

2. *Findings Concerning Group Consensus*

If there had been no within-group consensus on the relative degree of PA or the relative degree of PSS for the different photographs of the set, each of the photographs, for each of the groups, should have received a median score of 5 on each of the *Q*-sort dimensions. Actually, however, the distributions of median values, on both PA and PSS, varied across the set of photographs from 1 or 2 to 7, 8, or 9 (6 to 9 points on the 11-point scale used for the *Q* sorts). It would, of course, be improbable that any median values would extend to the extreme ends of the scale. Comparisons between PSS distributions and PA distributions for each group yielded nonsignificant Chi square values ($p > .05$), indicating a high degree of correspondence between the distributions of the two variables and, therefore, confirming the second hypothesis.

TABLE 1
DISTRIBUTION OF *r*'S BETWEEN SETS OF *Q*-SORT SCORES (PA *versus* PSS) FOR INDIVIDUAL *S*S IN EACH GROUP

Values of *r*	Frequencies					
	M-1-1	M-1-2	F-1-1	F-1-2	F-2-1	F-2-2
.90-.99	0	1	0	0	0	0
.80-.89	9	3	5	5	0	0
.70-.79	7	13	12	5	13	4
.60-.69	7	4	3	7	9	8
.50-.59	6	4	3	4	4	11
.40-.49	3	4	2	1	0	3
.30-.39	0	0	1	4	1	3
Below .30	1	2	3	0	1	1
N	33	31	29	26	29	31
Significant *r*'s[a]	32	29	26	23	28	30
Median *r*[b]	.69	.72	.72	.67	.76	.65

[a] Significantly positive at .01 level (.33 or higher). Only two negative *r*'s occurred (—.04 and —.10).

[b] Medians are exact values, not assuming equal spread across class intervals.

Table 2 provides evidence concerning between-group consensus. Column 2 presents the *r*'s between sets of median *Q*-sort scores on PA for selected pairs of groups. Column 3 presents comparable *r*'s for PSS. The first three *r*'s in each column are for groups paired across orders; those in Rows 4 and 5 are for groups paired across sexes; those in Rows 6 and 7 are for groups paired across instruction differences for PA; and those in the last two rows are for groups paired across sexes and across instruction differences. The magnitudes of these *r*'s indicate extremely high agreement between groups on the relative positions assigned to individual photographs with respect to PA and with re-

TABLE 2
PEARSON r'S BETWEEN SETS OF GROUP MEDIANS FOR PERCEIVED ATTRACTIVENESS (PA) AND FOR PERCEIVED SIMILARITY TO SELF (PSS)

Groups correlated	r between sets of group medians[a] PA	PSS
(1) M-1-1 *vs.* M-1-2	.93	.92
(2) F-1-1 *vs.* F-1-2	.90	.87
(3) F-2-1 *vs.* F-2-2	.92	.87
(4) M-1-1 *vs.* F-1-1	.89	.93
(5) M-1-2 *vs.* F-1-2	.91	.87
(6) F-1-1 *vs.* F-2-1	.93	.89
(7) F-1-2 *vs.* F-2-2	.90	.90
(8) M-1-1 *vs.* F-2-1	.87	.91
(9) M-1-2 *vs.* F-2-2	.89	.90

[a] The r's were computed with .5 as the class-interval range ($r \geqslant .33$ for $p < .01$).

spect to PSS. The data of Table 2, therefore, may be interpreted as confirming the third hypothesis.

3. *Group* r*'s Between PA and PSS*

Table 3 provides evidence confirming the fourth hypothesis, that within-group r's between median values for PA and median values for PSS should be significantly positive. The magnitudes of these r's are comparable to the magnitudes of the r's in Table 2, in which the r's represent across-group agreement on a single variable (PA or PSS), rather than, as in Table 3, across-variable agreement (PA *versus* PSS) within groups.

D. DISCUSSION

The present findings are consistent with the expectation that, among normal individuals, there should be a high degree of agreement between readiness to like another person (PA) and perceptual identification of the self with the

TABLE 3
PEARSON r'S BETWEEN SETS OF GROUP MEDIANS ON PA AND SETS OF GROUP MEDIANS ON PSS

Groups	r (PA *vs.* PSS)[a]
M-1-1	.94
M-1-2	.92
F-1-1	.94
F-1-2	.89
F-2-1	.93
F-2-2	.91

[a] The r's were computed with .5 as the class-interval range ($r \geqslant .33$ for $p < .01$).

other person (PSS). That PA and PSS, as defined by the operations of this study, should be highly correlated in individual *S*s is readily predictable on the basis of previous findings, and in terms of the assumed relationship between positive self-esteem and the tendency to extend such a positive attitude to others who are perceived as similar to the self. However, the finding of within-group and across-group consensus on both PA and PSS suggests that normal people in general have incorporated social norms (stereotypes) concerning the appearance of the ideally attractive person, concerning the characteristics of the "ideal personality," and concerning the appearance of persons representing the "ideal personality." The within-group findings, showing a high positive relationship between median values of PA and median values of PSS, therefore, suggest that normal self-perception may involve an identification of the self with the "ideal personality." Further studies will be aimed at testing these tentative predictions.

E. Summary

Two groups of male students and four groups of female students (total $N = 179$) individually *Q* sorted 60 photographs on perceived attractiveness (PA) and on perceived similarity to self (PSS). For all but 11 of 179 *S*s, the *r*'s between PA *Q*-sort scores and PSS *Q*-sort scores were significantly positive ($p < .01$). Median values of *r*'s for individual *S*s varied from .65 to .76 across groups. Within-group consensus occurred on relative PA and relative PSS across photographs. Across-group *r*'s between sets of median values on PA and on PSS varied from .87 to .93. Within-group *r*'s between PA and PSS varied from .89 to .94. Findings were consistent with predictions and suggested that normal self-perception may involve identification of the self with the stereotype of the "ideal personality."

References

1. Byrne, D. Attitudes and attraction. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology (Vol. 4)*. New York: Academic Press, in press.
2. Fensterheim, H., & Tresselt, M. E. The influence of value systems on the perception of people. *J. Abn. & Soc. Psychol.,* 1953, **49**, 93-98.
3. Fiedler, F. E., Warrington, W. G., & Blaisdell, F. J. Unconscious attitudes as correlates of sociometric choice in a social group. *J. Abn. & Soc. Psychol.,* 1952, **47**, 790-796.
4. Lott, A. J., & Lott, B. E. Group cohesiveness as interpersonal attraction: A review of relationships with antecedent and consequent variables. *Psychol. Bull.,* 1965, **64**, 259-309.
5. Newcomb, T. M. The prediction of interpersonal attraction. *Amer. Psychol.,* 1956, **11**, 575-586.
6. ———. The cognition of persons as cognizers. In R. Tagiuri & L. Petrullo

(Eds.), *Person Perception and Interpersonal Behavior.* Stanford, Calif.: Stanford Univ. Press, 1958.

7. ———. The Acquaintance Process. New York: Holt, Rinehart, & Winston, 1961.
8. PRECKER, J. A. The automorphic process in the attribution of values. *J. Personal.,* 1953, **21**, 356-363.
9. PRESTON, M. G., PELTZ, W. L., MUDD, E. H., & FROSCHER, H. B. Impressions of personality as a function of marital conflict. *J. Abn. & Soc. Psychol.,* 1952, **47**, 326-336.
10. SAPPENFIELD, B. R. Test of a Szondi assumption by means of M-F photographs. *J. Personal.,* 1965, **33**, 409-417.
11. TAGIURI, R. Social preference and its perception. In R. Tagiuri & L. Petrullo (Eds.), *Person Perception and Interpersonal Behavior.* Stanford, Calif.: Stanford Univ. Press, 1958.
12. TAGIURI, R., BLAKE, R. R., & BRUNER, J. S. Some determinants of the perception of positive and negative feelings in others. *J. Abn. & Soc. Psychol.,* 1953, **48**, 585-592.
13. THIBAUT, J. W., & KELLEY, H. H. The Social Psychology of Groups. New York: Wiley, 1959.

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SEX DIFFERENCES IN ANXIETY SCORES FOR COLLEGE FRESHMEN AND SOPHOMORES*[1]

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A. INTRODUCTION

Many different scales, indices, and measurements of various sorts have been used to measure anxiety. Females generally have higher anxiety scores or the male-female difference is reported as nonsignificant. Bendig (2), Sinick (5), and Vassiliou *et al.* (6) cited data for college age and older *S*s in which females had significantly higher anxiety measures. Other researchers have reported nonsignificant differences (2, 4).

Cattell (3), in discussing the nature and measurement of an index commonly referred to as anxiety, listed four questions which had relatively good correlations with physiological measures of anxiety. "Questionnaire items can be factored like behavioral or physiological variables. . . . correlates with a factor designated as 'ergic tension.' When this factor and others based on questionnaires are factored in turn, anxiety emerges as a 'second order' factor influencing them" (3, pp. 96-105). The present investigation utilized four questionnaire items reported by Cattell.

B. METHOD

1. *Subjects*

Fifty male and female college freshmen and sophomores were interviewed in dormitories. While male *S*s were usually seen in their rooms, female *S*s were usually questioned in the dormitory lobby. All were at a relatively quiet location and were volunteers.

2. *Apparatus*

The information sheet, a standard 8½-inch by 11-inch ditto, had questions requesting *S* to check his religion, strength of religious belief, and "how ner-

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[1] Dr. Harold Vetter, formerly at the University of Maryland, now at University of Florida was of considerable assistance in this study.

vous or uneasy he felt about taking part in the experiment." Cattell's four questionnaire items followed: (*a*) "Do you find yourself with strong moods of anxiety, amusement, sorrow, etc. which you cannot account for by anything that has recently happened?" (*b*) "Do you frequently get in a state of tension and turmoil when thinking over the day's happenings?" (*c*) "Do quite small setbacks irritate you unduly?" and (*d*) "Do you, when forced to remain inactive, begin to doodle, draw things on the margin of your paper, etc?"

All questions had a space in which *S* could check "yes" or "no." "The coefficients . . . show how well a 'Yes' answer to each question correlates with a factor designated as 'ergic tension' " (3, pp. 96-105). For questions (*a*) through (*c*), the loadings were .60, .57, .56, and .55, respectively.

3. *Procedure*

There were four sections of the main experiment dealing with sexual symbolism before the information sheet was distributed. The four sections included (*a*) pairing four pictures, (*b*) replying "male" or "female" to eight sketches, (*c*) drawing two pictures, and (*d*) choosing one picture out of a forced-choice three.

The information sheet was preceded by comments such as "The experiment is really over now, but I'm going to ask you to fill out this information sheet." After indicating that the "formal" experiment was over and that the information sheet was only a sideline, *S* completed the information sheet with a standard pen or pencil.

C. RESULTS

Number of questions checked "Yes," ranging from zero to four, were calculated for males and females. Males had a mean of 1.88 ($SD = 1.09$), whereas the female mean was 1.34 ($SD = .99$). Male and female *S*s yielded significantly different results ($t = 2.57$, $df = 98$, $.01 < p < .02$, $r = .25$).

D. DISCUSSION

Data obtained in the present study were quite different from that of other investigations. Males had a significantly higher mean than females, while most other experiments list females as higher or equal to male *S*s' anxiety scores.

Results may reflect the importance of sociological variables when dealing with anxiety. For instance, male *S*s may have been quite concerned about the draft. Societal components of anxiety may be just as or more important than individual, particular ones.

There may be several confounding variables. Male and female *S*s were tested in different locations. Males were in their dorm rooms, whereas females were in the dormitory lobby. The prior research, although constant for males and females, may have caused differences from *S*s' "normal" (not exposed to sexual symbolism investigation) responses. That *E* is a male may have also affected responses. Research using the same population without the possible confounding variables is suggested.

REFERENCES

1. BENDIG, A. W. College norms for and concurrent validity of Cattell's IPAT anxiety scale. *Psychol. Newsletter (NYU)*, 1959, **10**, 263-267.
2. ———. Age-related changes in covert and overt anxiety. *J. Gen. Psychol.*, 1960, **62**, 159-163.
3. CATTELL, R. B. The nature and measurement of anxiety. *Sci. Amer.*, 1963, **208**(3), 96-105.
4. IRVINE, L. F. Sex differences and the relationships between personality variables. *Psychol. Rep.*, 1957, **3**, 595-597.
5. SINICK, D. Two anxiety scales correlated and examined for sex differences. *J. Clin. Psychol.*, 1956, **12**, 394-395.
6. VASSILIOU, V., GEORGAS, J. G., & VASSILIOU, G. Variations in manifest anxiety due to sex, age, and education. *J. Personal. & Soc. Psychol.*, 1967, **6**, 194-197.

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BEHAVIOR MODIFICATION TECHNIQUES IN A PHYSICAL MEDICINE AND REHABILITATION CENTER*

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A. INTRODUCTION

Principles of learning theory have been employed with patients in psychiatric settings for some years. However, the implementation of learning theory and experimental procedures into physical medicine and rehabilitation centers is still very new.

Rice (5) and associates have begun a program using operant conditioning techniques with the multiply handicapped retarded patient. Foss (2) has suggested combining operant conditioning with the electrophysiological techniques developed by Hefferline (3) to provide external feedback of proprioceptive cues in developing motor control in cerebral-palsied children. Using the learning principle of knowledge of performance increases level of performance, Madison and Herring (4) used graphic performance records to feedback results to physically handicapped patients. Positive reinforcement procedures in physical therapy with quadriplegics and paraplegics have demonstrated superior results compared to standard procedures in weight lifting programs with these patients (7).

Most reports in the literature on behavior modification and learning theory based programs in physical medicine and rehabilitative settings have mainly focused on working with the physical aspect of the patient. An exception is a report by Fordyce (1). Fordyce has reported success in rehabilitating a chronic pain case by extinguishing pain behavior and reinforcing incompatible behaviors, such as walking and talking about other topics. The basic reinforcer used was social attention.

At Dodd Hall, the Physical Medicine and Rehabilitation Center for the Ohio State University College of Medicine, the behavior modification program directs itself to social, vocational, and ward management concerns, as well as to physical rehabilitation. The basic paradigm for our programs has

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been selecting the target behavior to be altered, selecting a mechanism for quantifying it, and making the presentation and withdrawal of positive reinforcers contingent on the presence or absence of the desired behavior. Social attention has been the reinforcer selected in most cases, and was used in two of the three cases to be presented here. The present report will illustrate the application of this behavior modification paradigm technique to three specific cases.

B. METHOD

1. *Patient 1*

Patient 1 was a 22-year-old quadriplegic who had been injured 10 months before the behavior modification program began. Although the patient was seen as friendly and cooperative, his persistence in goal directed behavior and his sense of responsibility were low. For example, his participation in Occupational Therapy (OT) and Physical Therapy (PT) was minimal, and he had frequent decubiti. The patient's employment record had been inconsistent, and he had had to repeat one year of high school, despite being of bright normal intelligence. From the very beginning of his hospitalization, the patient began to discuss the desire to attend a university as a method of coping with his handicap. Although this objective seemed feasible, the staff felt the goal would be unrealistic if the patient maintained his present lack of persistence. It seemed appropriate, therefore, to initiate a program while the patient was still in the hospital that, in part, would simulate university activities. The thinking was that a specific program would yield information about how much intellectual energy the patient was willing to extend over a period of time. The program would also give the patient practice in working on intellectual tasks, which he had done very little of in the last several years.

The specific activity selected for the program was amount of time the patient engaged in reading each day. The regime of positive and negative reinforcement was to be presentation and withdrawal of social attention. A bar graph was placed on the patient's wall, and the entire staff was instructed to comment on his reading and to engage in social interaction as long as the patient was increasing or maintaining his reading level. The staff's social attention was withheld when there was a decrease in reading time from the previous day.

As can be seen from Figure 1, the patient read less than 30 minutes a day before the program began. The mean reading time rose dramatically and was maintained during the entire 10 week period. His mean reading time per day for all 10 weeks was three hours and nine minutes, as compared with less than 30 minutes per day before the study. The patient, thus, was able to increase and sustain goal directed efforts over a long period of time. The program seemed to have some generalization effect in that the patient during the 10 week period increased the amount of time he spent practicing typing. He also began actively corresponding with various universities about their facilities for handicapped students. The reinforcement program was terminated due to patient surgery.

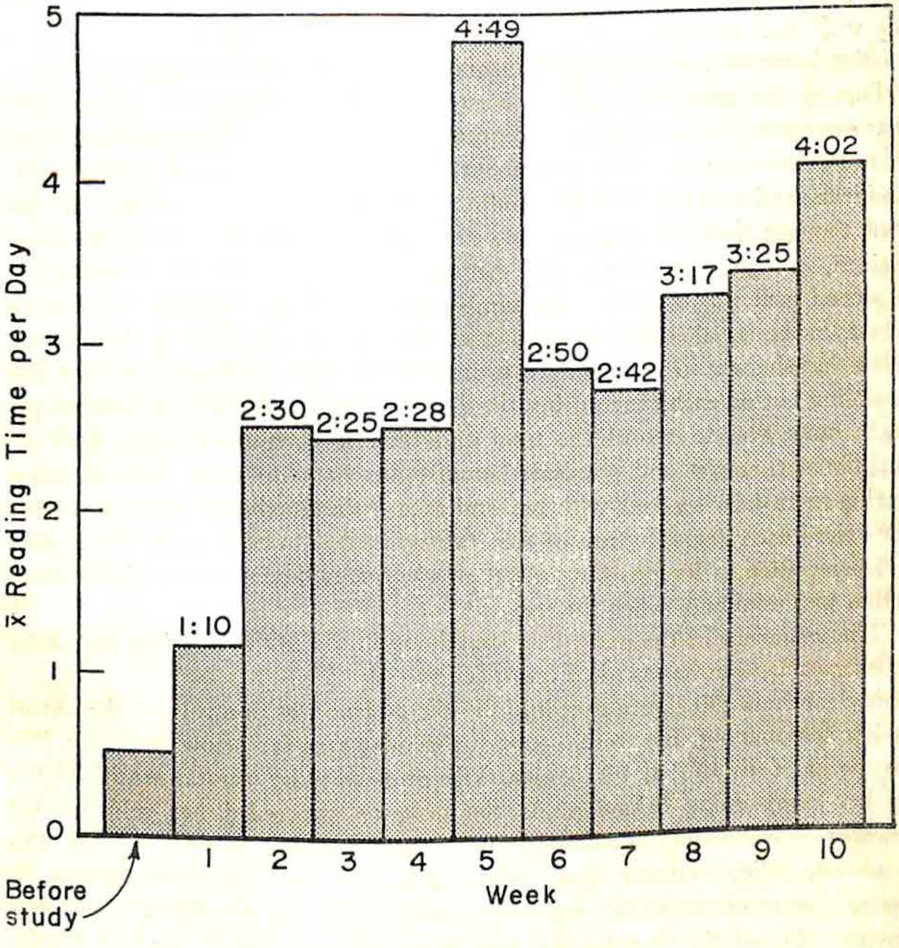

FIGURE 1
X Number of Hours Spent Reading Before and During 10 Week Study

2. *Patient 2*

Patient 2 was a 54-year-old housewife of average intelligence with multiple sclerosis. The patient had been married for 35 years and her husband was a school principal. Initially, the patient was hospitalized for one week, and then rehospitalized three weeks later. During the first week the patient was such a chronic and bitter complainer that both the staff and patients found her very disruptive and disturbing. In fact, after only a week's time she was somewhat of an outcast among the patients, and the quality of treatment by the staff had dropped. Her husband was also considering placing her in a nursing home because of her many demands and constant complaining at home.

During the three week period between hospitalizations, the staff decided that some behavior modification program would be appropriate for the patient in order to obtain optimum treatment for her to reduce ward management problems, and to insure that she would not disturb other patients. Because the staff thought that she was probably not even aware of how much she complained, one goal was to sensitize her to the chronicity of her complaining. A second goal was to reduce the number of complaints. The basic mechanism was to make social attention contingent on her not complaining. It was decided that she was to wear a wrist counter every day, and she was to push the recording button each time during the day that she complained. At bedtime the night nurse was to record the total and reset the counter to zero. Her occupational therapist and physical therapist were also to wear wrist counters during their daily sessions with her and record the number of complaints that she voiced each day. The rest of the staff was asked to be friendly and engage in conversation as long as the patient was not complaining, but to keep interaction to a minimum when she was.

The frequency of the patient's complaining in PT, OT, and her own daily self-report log can be seen in Figure 2.

It is clear from this figure that initially the patient was unaware of the extent of her complaining. Her total count for the day was far below the count just during her daily OT or PT session. Wearing the wrist counter sensitized her to her complaining behavior. As the program proceeded her self-reported number of complaints agreed more with those reported by OT or PT. The most compelling evidence from Figure 2 is the very significant decrease in the frequency of complaints noted by both the OT and the PT worker after the first day of the experimental sampling. Although the frequency of complaints continued to decrease somewhat, the drop was not nearly so dramatic as that noted on the second day. It also became obvious from staff comments and from observation of her behavior at the center that the amount of her complaining in general had drastically dropped and that the behavior modification technique was having an effect. Problems at the center seemed to reduce concomitantly, and instead of ostracizing her, patients were much more receptive to her. The behavior modification program terminated when the patient was discharged to her home.

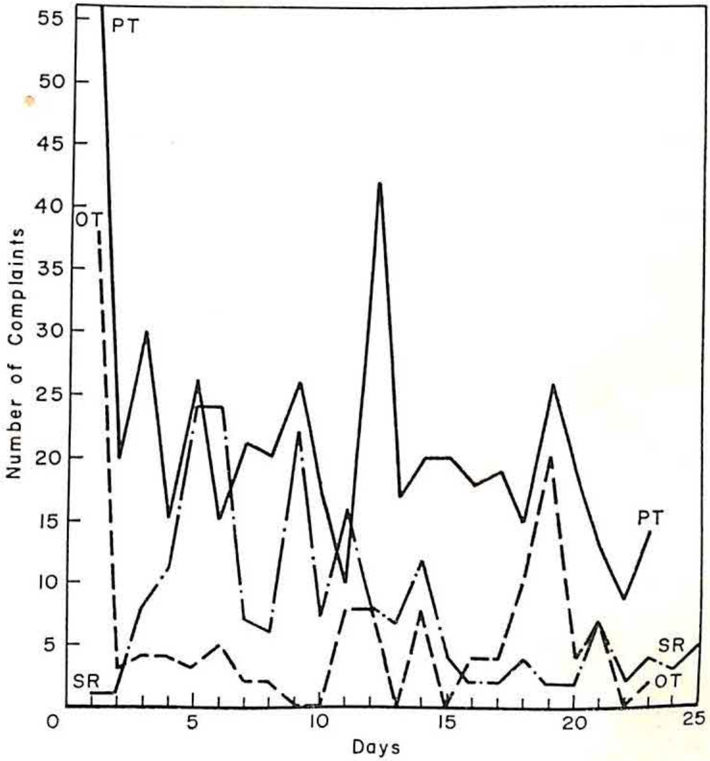

FIGURE 2
PHYSICAL THERAPISTS (PT), OCCUPATIONAL THERAPISTS (OT), AND PATIENT'S SELF-REPORT (SR) OF DAILY COMPLAINING BEHAVIOR

A comparison of her personality test results on the Minnesota Multiphasic Personality Inventory upon admission and after she had been home two weeks showed no major personality changes, but did show she was somewhat less anxious and depressed. Although there may have been no major personality changes, her hospitalization at the center appeared to have been greatly improved by the employment of behavior modification techniques to reduce complaining.

3. *Patient 3*

Patient 3 was a 37-year-old married Negro man who had a measured *IQ* of 120 and was an unemployed writer who had been rendered quadriparetic by an auto accident. Prior to his accident his wife was supporting the family. During the first week the patient was engaging in much psychotic talk and dependency ploys. Within the first week the patient asked the staff psychologist, the psychology intern, the staff social worker, the consulting psychiatrist, and a psychiatric resident about psychotherapy. The patient had already had four years of psychotherapy, and additional psychotherapy at this point in his life seemed contraindicated, because it was suspected that he would use it to increase his already overwhelming dependency behavior, that it would be difficult to keep him from using therapy to feel less sure of himself, and that the staff felt he would probably use therapy to avoid working on his rehabilitation training. As an example of the extent of pathological dependency, *before* his accident his wife actually physically fed him.

The procedure the staff decided upon in this case was to withhold attention (withhold a positive reinforcer) from the patient when he talked about his many and varied psychiatric complaints, thus bringing about extinction of this behavior. At the same time the staff was to actively respond to the patient's talk about other topics, especially topics, such as progress in OT and PT, thus positively reinforcing behavior which was incompatible with "psychiatric talk" behavior. We hoped that this would increase his feelings of adequacy, independence, and responsibility, and decrease his feelings of helplessness and dependency. Accordingly, the first source of data to be considered for this case is a comparison of the Minnesota Multiphasic Personality Inventory (MMPI) given to the patient at admission and again at discharge. This criterion measure was chosen to determine the effects of denying the patient psychotherapy and substituting behavior modification. Comparison of the two test results was made to determine what effects the procedures had on the patient's personality and psychological adjustment as reflected by the MMPI. The comparison showed that the patient had lower psychopathology scores on 8 out of the 10 diagnostic scales and higher ("improved") score on the special Ego Strength scale. The differences are significant at the .01 level of confidence. Comparison was also made using the D^2 technique (6). Patient 3's D^2 score was 1236, a statistically significant finding. The conclusion from the personality data is that during the three month behavior modification program the patient's psychological adjustment improved. In descriptive terms the tests showed that the patient improved in terms of self-confidence and self-esteem, was less preoccupied with his physical problems, less depressed, less dependent, had a better sense of identity, was less obsessive and ruminative, was in better touch with reality, and was more sociable. These improvements are consistent with the specified goals of the program.

The second source of data consists of ratings obtained from a staff person in social work, nursing, physical therapy, occupational therapy, housekeeping, and the medical resident. The staff person in each area who had the greatest amount of contact with the patient rated him from 1-7, good to poor, as they saw him at admission and as they saw him at discharge. We were interested in whether or not the staff person rated the patient as having changed in amount of psychiatric talk. Moreover, consistent with our assumption that the talk reflected both feelings of poor self-esteem and a maneuver to avoid responsibility, we also asked the staff to rate on these other dimensions: adjustment, likability, cooperativeness, independence, and manipulativeness.

As can be seen in Table 1, the patient made improvement in each of these areas. The patient showed the greatest quantitative changes in rated psychological adjustment and in independence. The ratings by the staff correctly reflect the fact that the patient discontinued his psychotic talk during the program and, in general, became adaptive in his rehabilitation program.

TABLE 1
BEFORE AND AFTER STAFF RATINGS ON PATIENT 3

Variables	Dr.	S.W.	OT	PT	Nurse	Aide	*p*
Problem talk	3	1	3	1	3	3	.01
Adjustment	4	3	4	3	5	4	.01
Likability	3	NC	2	NC	2	2	.10
Cooperativeness	1	3	—2	NC	4	3	.01
Independence	4	3	5	3	2	4	.01
Manipulativeness	2	1	2	3	1	3	.15

C. SUMMARY

The aim in writing this paper has been to illustrate how behavior modification procedures can have practical implications for improved patient treatment and ward management in a rehabilitation setting. Of course, the techniques can be applied to other problems, such as weight gain or loss and therapy attendance with success. Applications of experimental and laboratory technology to clinical settings rarely occur without some violations of scientific purity;

this has undoubtably been the case in some of our procedures. However, these procedures have been useful, are easy to adapt to a particular setting, and can be readily taught to staff.

REFERENCES

1. FORDYCE, W. E., FOWLER, R. S., & DELATEUR, B. An application of behavior modification technique to a problem of chronic pain. *Behav. Res. & Ther.*, 1968, **6**, 105-107.
2. FOSS, B. M. Operant conditioning in the control of movements. *Devel. Med. Child. Neurol.*, 1966, **8**, 339.
3. HEFFERLINE, R. F., & HARFORD, R. A. Escape and avoidance conditioning in human subjects without their observation of the response. *Science*, 1959, **130**, 1338.
4. MADISON, H. L., & HERRING, M. An experimental study of motivation. *Amer. J. Occup. Ther.*, 1960, **14**, 253-255.
5. RICE, H. K., MCDANIEL, M. W., & DENNEY, B. S. Operant conditioning techniques for use in the physical rehabilitation of the multiply handicapped retarded patient. *Phys. Ther.*, 1968, **48**, 342-346.
6. SINES, J. O. Actuarial methods in personality assessment. In Mahr, B. (Ed.), *Progress in Experimental Personality Research.* New York: Academic Press, 1966.
7. TROTTER, A. B., & INMAN, D. A. The use of positive reinforcement in physical therapy. *Phys. Ther.*, 1968, **48**, 347-352.

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A NOTE ON TASK AND SITUATIONAL FACTORS IN WORK ORIENTATION AND SATISFACTION*

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A. INTRODUCTION

In the study of work motivations, a most important approach is through experimental trials that are directly related to theoretically relevant variables and "hard criteria" of evaluation. A recent volume (2) describes a series of field trials dealing with the problem of motivating workers especially through "job enrichment." The underlying theory is drawn largely from the work of Herzberg *et al.* (3), who postulated two factors of work motivation, the major motivation relevant to effective productive capacity for the individual being associated with satisfaction gotten from the work itself. From the point of view of optimum hiring practices, given equal abilities and experience, the theory suggests selection of personnel who are motivated in such a way that they get satisfaction from the work itself. The corollary to this is that if the selection of individuals is not feasible, then it may be important to find ways of motivating the individual through structuring the job so that it provides more satisfactions—work satisfactions—for the individual. Selection is not feasible, or at least it loses some of its usual meaning, in times of full employment when companies may have difficulty in even maintaining their labor force because, for all practical purposes, there is no one to hire. The appeal of the "job enrichment" approach is very strong since the trend is counter to the old industrial psychology of the "efficiency" approach in "dehumanizing" tasks by making them as simple and routine as possible. The enrichment approach attempts to be responsive to those aspects of the work situation that are rewarding for the individual, and often the result is one of synthesizing jobs into meaningful units over which the individual may have both responsibility and control. The approach appears to be attractive both to management and labor, and the accusation of "management-oriented" social science is difficult to maintain. Frequently, the benefits to the organization are in reduction of

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turnover rates, reduction of absenteeism, and other such "hard criteria" that are indicative of the worker's *attraction* to the job. Phrased in another way, benefits to the organization often are not so much a matter of unit production costs as of tooling and retooling costs associated with high turnover, a factor that is most often present in situations where workers have little satisfaction from their work.

Some hypotheses involved in the analysis of worker satisfactions are not subject to direct examination. There are some job limitations that cannot be eliminated, and some jobs indeed may be described as difficult to "enrich." Thus, an approach to examining differences among groups where job differences are of theoretical importance is useful to find out whether facts are at least compatible with the motivation theory. There are other group differences, however, associated with characteristics of members that may lead to different group scores on work motivations and satisfactions. For example, differences in education, ethnic, and other social characteristics may have ramifications for work orientations and satisfaction. Such motivations are subject only to descriptive study as is reported here.

B. METHOD

The research reported here was drawn from five samples of female workers in companies of the Bell Telephone System. One sample of 608 traffic operators was drawn from a unit in the East. A second sample of 391 information operators was drawn from two medium-sized Midwestern cities. These jobs are viewed as difficult to "enrich" because of the constrictions on the work to be done. A third sample of 93 service representatives was drawn from a company in an eastern state. Two samples of service representatives were drawn from a major Midwestern metropolitan area, 199 from suburban areas and 212 from the central city. The samples were among a large number of groups studied, but these five samples are relevant to this study because they responded both to a 16-item "Reactions to Your Job"[1] form and the *Work Components Study* (1).

The different groups provided an opportunity for examining several "hypotheses" as follows:

Hypothesis 1: Persons occupying more constrictive jobs and generally expected to have lower education (operators) have less "work" orientation and greater "security" orientation than persons occupying jobs permitting more individual action and generally recruiting persons of higher education (service representatives).

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[1] The Cronbach Alpha for this form, based on 500 arbitrarily selected female cases, was .85.

Hypothesis 2: Operators will indicate lower job satisfaction than service representatives.

More subtle hypotheses were discussed in advance of the analysis, but since not all were clearly formulated, only those for which reasonable evidence exists in the data are presented in the analysis below. It should be noted that, corresponding to four of the samples, data were available for substantial numbers of management personnel in immediate supervisory capacities with regard to the workers. These data are presented also and are discussed below, and the hypothesis applicable follows:

Hypothesis 3: Persons in the supervisor (control) position will report greater job satisfaction.

Interpretation of the profile differences must be made with great caution as there are differences for these groups not only in companies and in jobs, but, as we have noted, also in the geographical area. Language differences by themselves may sometimes affect scores, and since there are presumed educational differences, these may also be related to regional factors as well.

C. Results

Comparison of the groups on *WCS* 1 (*Work Components Study,* Score 1), "Potential for personal challenge and development," (see Table 1) suggests no great differences. Eastern operators possibly may be a trifle lower on the score, but the difference appears relatively trivial. Eastern traffic operators appear to be somewhat lower on *WCS* 2, "Responsiveness to new demands." Examining the rest of the profile, indeed, it appears that the Eastern operators are on the low side also for *WCS* 3 and *WCS* 4, "Competitiveness desirability" and "Tolerance for work pressure," concepts also associated with favorable work orientation. The Eastern operators appear to be highest on *WCS* 5, "Conservative security." On *a priori* grounds, the job of Eastern operators is seen as one that is highly constricted by the task that is involved.

The Midwestern information operators appear to be high on *WCS* 5, "Conservative security." Both groups of operators, thus, appear to be higher than service representatives on this score. The additional distinctive score for this group of information operators is the somewhat higher score on *WCS* 7, "Surround concern."

The Eastern state service representatives and the Midwestern suburbs service representatives appear to have similar profiles. The Midwestern urban service representatives are similar to the other service representatives in that they have lower scores on *WCS* 5, "Conservative security," and *WCS* 7, "Surround concern," but they tend to be similar to the operators in other scores. It should be noted that the Eastern state and Midwestern suburban service representatives tend to include more persons with college education and fewer minority group members.

On the *RF* (Reactions to Your Job Form), work satisfaction appears to be lowest for the two operator groups and for the Midwestern service representatives. Since sample sizes are small and data are unstable, and also since data collection was more erratic, only the scores on the *RF* are presented here for the "management" respondents. It will be noted that, in general, the scores are considerably higher than is the case for the corresponding samples of workers.

With regard to the relationship between the *WCS* and *RF*, the more or less systematic relationships (i.e., replicating) are a small positive relationship between *WCS* 3, "Competitiveness desirability," and a high *RF* score. In other words, if persons are oriented toward their work situations such that they favor a competitive situation and being rewarded for their success and individual contributions, they appear to be higher on the *RF* form also. The relationship appears to be somewhat higher for the service representatives who presumably have jobs with more flexibility permitted, than for the two classes of operators. A somewhat higher relationship that parallels the one noted immediately above occurs between *WCS* 4, "Tolerance for work pressure," and the *RF* scores.

A relationship that appears to be substantial in these data is between *WCS* 5, "Conservative security," and the *RF* score, but in this case the higher values occur for the two classes of operators. Thus, it appears that orientation toward security is associated with a high *RF* score in this class of job where potentially, one may presume, enrichment is least possible.

Our conclusion from the examination of these samples is that the differences noted are consistent with the theory of work motivation that suggests the importance of satisfaction through the work itself. In general, persons in positions of constricted work have lower satisfactions. Two of the nonmanipulable variables involved here are constriction of the job by type of work and by level of responsibility. Other nonmanipulative variables including personal characteristics are implied in the comparisons.

REFERENCES

1. BORGATTA, E. F., FORD, R. N., & BOHRNSTEDT, G. W. The Work Components Study (*WCS*): A revised set of measures for work motivation. *Multivariate Behav. Res.*, 1968, **3**, 403-414.
2. FORD, R. N. Motivation Through the Work Itself. New York: American Management Association, 1969.
3. HERZBERG, F., MAUSNER, B., & SNYDERMAN, B. The Motivation to Work. New York: Wiley, 1959.

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FURTHER ASPECTS OF CONSTRUCT VALIDITY OF THE ZUCKERMAN SENSATION-SEEKING SCALE*

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A. INTRODUCTION

Comparatively recently, various theorists have proposed an "optimal" stimulation level: i.e., a sort of homeostasis toward which the organism operates. Leuba (17), for example, states that when an organism falls below this level, it seeks conditions increasing stimulation, whereas if above this level, it will seek conditions decreasing it. Hebb (14) discusses this concept with respect to such a level of the brain activating system, and others (5, 6, 11) interested in conceptualization of arousal-quiescence have extended formulations related to this topic, especially those of the reinforcing qualities of various stimulation levels. Implications of the preceding for the sphere of personality have been suggested by Maddi: "That the need for variation can be considered an aspect of personality is suggested by observation that individuals show reliable differences in the intensity and quality of their variation-seeking. Some people are simply more interested in, and disposed toward, the occurrence of change, novelty, and the unexpected than are others. . . . At this time, the major stumbling block to investigation of the need for variation as a dimension of personality is lack of a method of assessing its intensity." (18, pp. 273-274).

In an attempt to remove this "stumbling block" and to quantify the concept of "optimal" stimulation, Zuckerman, Kolin, Price, and Zoob (24) developed a Sensation-Seeking Scale (SSS), constructed in forced-choice format and controlled for social desirability. Item content included preferences for novelty, unfamiliarity, irregularity, excitement or thrills, extremes of sensation, adventure, etc., or for their opposites. With college student *S*s, factor analysis revealed one large factor, which while not labeled, was most probably "sensation seeking." Items loading high on this criterion were selected for the final SSS, although some had significant loadings for males, some for females, and some for both sexes, making separate sex scores possible. Split-half *r*'s were reported as .68 and .74 for males and females respectively with comparatively small *N*s.

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In seeking clarification of the trait or traits measured by the SSS, Zuckerman *et al.* (24) correlated it with other measures. One was the Thurstone Embedded Figures Test (EFT) which they contended measures field dependence or independence. The latter was explored because on the one hand, it was thought that SSS might reflect impulsivity or psychopathic tendencies which in turn had been found to be related to field dependence; on the other hand, field independents, as compared to field dependents, had been shown as more responsive to internal sensations. Zuckerman and his co-workers (24) found SSS significantly correlated with field independence (EFT) for males but not for females. Although they did not use a *direct* measure of impulsivity or psychopathic tendencies, they said, on the basis of EFT correlations only, that SSS tendency was not a measure of impulsivity. Other measures they correlated with the SSS were a Stimulus Seeking Maze Test (SSMT), and anxiety, depression, and hostility scores derived from a Multiple Affect Adjective Check List (MAACL) constructed by Zuckerman, Lubin, Vogel, and Valerius (25). The former, allowing *S* to vary paths from maze to maze, was thought possibly to involve need for stimulus change. With regard to the latter, it was postulated that anxiety should correlate negatively with SSS, since the more anxious individual would tend to avoid sensation-seeking or tension-arousing situations; predictions for depression and hostility, however, were uncertain. Results revealed nonsignificant *r*'s with the SSMT and with depression and hostility scores of the MAACL, but a negative and significant *r*, as predicted, with the anxiety score of the latter.

Later work by Zuckerman and colleagues (27), and by Zubek [cited in Zuckerman, Schultz, and Hopkins (23)], using sensory deprivation and confinement experiments, revealed that tendencies toward high sensation-seeking predicted quitting behavior and restlessness in confinement, whether or not *S* experienced sensory deprivation (SD). Zuckerman *et al.* (23) attacked directly the relationship between SSS and volunteering for SD and/or hypnosis experiments, using as *S*s undergraduates of both sexes from different colleges in the east and south. In all three situations, volunteers were "solicited," "requested," or asked whether they would "like to be" in one of these experiments, with the privilege of acceptance or nonacceptance. (The procedure is stressed here because it is somewhat different from "volunteering" in our study.) In five of six groups studied, SSS was found to be associated with volunteering for either SD or hypnosis experiments. However, interesting sex variations were found. Studies of male volunteers *vs.* nonvolunteers for SD experiments showed more discrepancies than for comparable groups of females. SSS was also found to have a low significant *r* of .21 with the MMPI

Ma scale, but no correlation ($r = -.01$) with the Taylor Manifest Anxiety Scale. Another study by Zuckerman, Persky, Link, and Basu (26) revealed SSS to be complexly related to social confinement; i.e., high SSS people adapted well to confinement with another person in an experimental situation.

The present research attempts to clarify further the construct validity of the SSS by examining its relationship to a number of other variables. The first is an "unusual experiments" scale, derived from rankings of experiments from unusual to mundane and pursues further the thinking of Zuckerman *et al.* (23) with somewhat different methodology. The second is a group of MMPI variables—the Manifest Anxiety (At), Depression (D), Psychasthenia (Pt), and Psychopathic Deviate (Pd) scales (9). The At scale was used because conflicting evidence was presented by Zuckerman and his coworkers—anxiety, as noted above, was significantly negatively related to SSS when the MAACL was used (24), but showed an insignificant r with the At itself in another study (23). The D scale was used because, although Zuckerman *et al.* (23) found an insignificant r with depression scores derived from the MAACL, they felt that depression should be negatively related to SSS, an impression supported by Dahlstrom and Welsh (9) in their discussion of characteristics of high scorers on the D scale. The Pt scale has not only been found to be highly related to anxiety (8, 10), but one would expect individuals high in tendency to worry, compulsivity, rigidity, etc. to be the antithesis of sensation-seekers. As regards the Pd scale, Zuckerman and coworkers (24) at first suggested that SSS might measure impulsivity or psychopathic tendencies, and this prediction, with modifications, seemed to be supported in a later article (23). Finally, relationship of the SSS to preferences for complexity-simplicity as reflected in the Barron-Welsh (4) Art Scale (BW) was examined in the present study. Previous research by Barron (1) noted that *S*s preferring complexity described themselves in a manner which might resemble the sensation seeker, while those preferring simplicity described themselves as more placid. Also, Holt and Goldberger (15) found the BW positively related to adaptiveness of responses to perceptual isolation.

B. PROCEDURE

*S*s were 102 females and 109 males in an introductory freshman psychology course, all of whom *had* to participate in some experiment as a course requirement, and in a sense, were "captive" volunteers. Since we were interested, like Zuckerman *et al.* (23) in willingness to volunteer for unusual experiments, we decided to build an Unusual Experiments Scale (UES) with described experiments ranging from exciting to dull, to allow all *S*s to rank order their choice of experiments. However, it was first necessary to scale a number of experiments for unusualness or excitingness. Accordingly, 121 other *S*s from a sophomore psychology course were asked to rate six experiments on a five-point scale from one (very dull) to five (very unusual). These experiments, some derived from actual psychological literature and some contrived, were delineated in about equal length paragraphs. Experiment 1 was described as an inverted retinal image study with *S* being required to wear a set of "specially constructed glasses" and to walk about, pick up things, not bump into objects, etc.; Experiment 2 as an ESP study in which *S*s would undergo a nonharmful "treatment" to increase powers of ESP; Experiment 3 as a study in which *S*'s "exposure to simultaneously conflicting sensations" of temperature and brightness would affect another sensory modality, such as smell and taste; Experiment 4 as a routine nonsense syllable learning study; Experiment 5 as one involving memory distortion of perception of objects over time as a drawing was passed from *S* to *S*; Experiment 6 as one subjecting *S* to hypnosis with posthypnotic suggestion of anosmia. Scale means of ratings of judges are presented in Table 1, with differences between means tested by Duncan's Multiple Range Test.

TABLE 1
RESULTS OF DUNCAN'S MULTIPLE RANGE TEST WITH SCALING DATA ON DEGREE OF UNUSUALNESS
($\alpha = .01$)

	Experiments					
Measure	4	5	3	2	6	1
Mean	2.273	2.975	2.990	3.850	3.959	4.380

Note: All pairs connected with a straight line do not differ significantly from one another.

Table 1 reveals four groupings, from most to least unusual, as follows: experiments 1;6 and 2;3 and 5; and 4. Therefore only four descriptions (Experiments 1, 2, 3, 4) from the scaling study were used for the main *S*s in the study, with Experiments 5 and 6 being arbitrarily discarded because 5 was not significantly different from 3 nor 6 from 1. During a class session, *S*s were told that all four experiments would require about the same amount of time, that they would be conducted at *S*'s convenience, that they might not be able to have their first choice and that it was therefore necessary for them to indicate their order of preference for the four. (This procedure differed from that of Zuckerman *et al.* (23) in that our *S*s were allowed the choice of volunteering for experiments in a preferential order, rather than that of either volunteering or not volunteering.) A quantitative measure of preference for "volunteering" for unusual experiments was then obtained from the rankings by assigning points to the 24 possible combinations from most to least unusual; i.e., a value was given to each set of rankings by the *S*s according to the serial position of excitingness of the experiments as previously determined by the judges. Thus, a ranking of 1, 2, 3, 4 was given 24 points; 1, 2, 4, 3 was assigned 23 points; 2, 1, 3, 4—22 points; and so on down with a ranking of 4, 3, 2, 1 being assigned 1 point.

TABLE 2
CORRELATIONS BETWEEN THE SSS AND OTHER VARIABLES

Variables	Males ($N = 109$)	Females ($N = 103$)	Combined ($N = 212$)
At	—.10	—.14	—.12
D	—.74***	—.54***	—.64***
Pd	.02	.05	.04
Pt	—.06	—.15	—.10
UE	.12	.35***	.23*
B-W	—.21*	.30**	.17

* $p < .05$.
** $p < .01$.
*** $p < .001$.

The *S*s were also administered the SSS and the items making up the At, D, Pd, and Pt Scales (Pd and Pt non-K corrected because both Goodstein (13) and Norman and Redlo (20) reported K elevated among college students and because we wished to reduce testing time) of the MMPI in a group session. The latter was conducted during a class period two weeks after *S*s had expressed preferences on the UES to avoid possible association between the UES and the personality tests; the BW was given in individual testing after the group session. Use of personality measures (MMPI scales, SSS, BW) was preceded by explanation that these were research instruments and *S*s would be aiding a personality research program. Data for males and females on all measures were not normally distributed and a T-score transformation was employed to normalize the data. Predictions were that there would be positive *r*'s between SSS and UES, Pd, and BW, and negative ones between SSS and At, D, and Pt.

C. RESULTS

Correlations between SSS and the various other measures are given in Table 2. It is apparent from this table that correlations are generally in the predicted direction, except that for males in the case of BW. Extremely high and significant *r*'s occur between SSS and D, and two of three *r*'s are significant between SSS and UES.

Because of conflicting results in Table 2 with the BW (significant negative *r* with males, but significant positive *r* with females), it was decided to explore the dimension of "complexity-simplicity" further. Earlier research by Barron and Welsh (4) and personal communication from Welsh indicated that BW scores below 20 represented simplicity preference, whereas those above 40 indicated complexity preference. Thus, all *S*s with raw scores ⪙19 and ⪚40 on BW were selected and relationship to raw SSS examined with the Mann-Whitney U Test (21). Results of the latter, corrected for tied ranks, are presented in Table 3. This table clearly demonstrates that high (complex) *S*s on the BW have signficantly greater SSS scores than do low (simple) *S*s regardless of sex.

TABLE 3
RESULTS OF MANN-WHITNEY U TEST BETWEEN SIMPLE AND COMPLEX CATEGORIES OF BW AND RAW SCORES ON THE SSS

	Males		Females	
Measure	$(N = 52)$ Simple	$(N = 12)$ Complex	$(N = 28)$ Simple	$(N = 27)$ Complex
Mean SSS	15.52	18.42	15.93	19.64
Mean rank	29.80	44.21	21.56	34.21
z	2.418**		2.932***	

** $p < .01$.
*** $p < .001$.

Table 3 also reveals that about twice as many males as females are in the simple BW category; on the other hand, about twice as many females as males are in the complex category. (A χ^2 test of this difference, using a 3×2 table with all *S*s in this study is highly significant, $\chi^2 = 12.91$, $p < .01$.) The greater number of males attaining simple BW scores and the fewer achieving complex scores helps account for the *r* of —.21 between SSS and BW reported in Table 2. There is thus a complex interaction between sex, SSS, and BW.

D. DISCUSSION

The present study found an insignificant *r* of .12 between UES and SSS for males, but a significant one of .35 for females. Zuckerman, Schultz, and Hopkins (23) report, as a result of several studies done at different colleges, that sex of volunteer, as well as type of experiment volunteered for (e.g., SD *vs.* hypnosis), seems to make a difference in mean SSS scores. They say that differences between male volunteers and nonvolunteers for SD experiments seem to reflect more regional or other differences than do those of females. Even though our approach to "volunteering"—i.e., measures on the UES scale—was different from theirs, we can concur with their finding that sex differences do complicate the relationship between SSS and volunteering but that overall there is a significant positive relationship between SSS and volunteering for unusual experiments.

Our data support strongly the fact that SSS is negatively correlated with depressive tendencies, at least as measured by the MMPI. However, Zuckerman *et al.* (24) found an insignificant correlation with a depression score derived from the average of two or three MAACL scores. It is quite probable that this difference in finding is due to the fact that the MAACL was destined to measure more transitory affective states, since Zuckerman (22) reported that it has much higher retest reliability when taken with a "long-term" set than with a "now-today" set. The MMPI, on the other hand, is supposed to measure relatively stable aspects of personality.

The status of anxiety and its relationship to SSS is yet uncertain, perhaps confusing. Zuckerman *et al.* (24) reported a significant negative r of —.32 with MAACL anxiety; on the other hand, a later study by Zuckerman and others (23) gave a correlation of —.01 with the MMPI At scale. Our results of r's with At of —.10, —.14, and —.12 respectively with males, females, and both sexes combined, while in the expected direction, are not much better. Confusion is added when one also considers the fact that MAACL (given with a "long-term" set) tended to correlate well with At (22). It may be that the r of —.32 with MAACL anxiety, even though significant, was a randomly attained one, or as is more likely and as was noted above with depression, response sets may play a differential role in a check list type of item as against the usual MMPI item. The matter of response sets within the MMPI itself should also be considered. For example, MMPI K correlates only —.17 with D among college students (9), but —.56 with At (8). It is possible that the higher defensiveness on At reduces accuracy of scores as an anxiety measure and lowers r's with SSS, both ours and Zuckerman's (23). The reverse may be true of correlations with D.

Correlations with the MMPI Pd scale in our study hover around zero. Zuckerman, Schultz, and Hopkins (23) reported a finding by Kipnis of significant r of .29 between Pd and SSS with naval recruits, a different group from our *S*s. Contrariwise, they also reported *lower* Pd scores among a group of army volunteers for SD experiments, which would argue against a firm relationship between SSS and Pd. Thus, the SSS-Pd relationship is complex, perhaps depending in part on the nature of subjects used, and one cannot at all conclude that individuals who have psychopathic deviate tendencies as revealed in the MMPI would be high sensation seekers. Relationships between SSS and Pt are also insignificant with our *S*s. Even though Brackbill and Little (8) report an *r* of .81 between At and Pt for college students, we examined Pt because it has only a small (25 percent) item overlap with At. However, it would seem that self-professed sensation-seeking tendencies do not relate in any way to obsessive-compulsive personality features as measured in a non-K corrected MMPI scale.

Our results with the BW Art Scale are, as noted above, complicated by the sex difference factor. Bieri (7, p. 376) reviewing work with the BW and the dimension of complexity-simplicity as a personality variable cautions that "it should be borne in mind that the sex differences in these studies may be crucial, and that for women, personality characteristics related to complexity preference are more typical of the feminine role." While it is true that significantly greater number of our women than men *S*s had complex scores and *vice versa,* the Mann-Whitney test reveals that complex BW scorers have significantly higher SSS scores, regardless of sex. Some time ago, Barron (1, 2, 3) found important differences between complex and simple scorers on BW. The former favored modern, primitive, and abstract or unstructured art; the latter preferred more traditional and formal art such as portraits, religious themes, landscapes, etc. High scorers tended to describe themselves as dissatisfied, pleasure-seeking, and unstable; low scorers as contented, gentle, and stable. Preference of complex scorers for nontraditional art was accompanied by low political-economic conservatism scores and "independence" in the Asch social judgment situation; the opposite was true of simple scorers. Complex scorers were rated as having high personal tempo, verbal fluency, and impulsiveness, and were seen as more original and flexible. Simple scorers were rated as being more constricted and rigid with more control of impulse by repression. If one examines SSS items, one receives the impression that high SSS scorers would resemble Barron's complex *S*s in personality style. While Moyles *et al.* (19) argue that one should not infer psychological simplicity or complexity of *S*s on the basis of their scores on the BW, it is our opinion that personality style, of which SSS is but one measure, *is* reflected in BW preferences. Some indirect evidence for support of this opinion is offered in other research, not directly concerned with the BW. Frumkin (12), for example, reported that low scores on the Rokeach Dogmatism Scale were accompanied by greater preference for modern painting (i.e., more complex, abstract art). Knapp and Wulff (16) found that those preferring abstract in contrast to representational art had higher Aesthetic but lower Religious (nonconforming?) values on the Allport-Vernon Study of Values. They also scored significantly higher on the Sensation-Intuition dimension of the Myer-Briggs Type Indicator, and on a number of measures of cognitive complexity (e.g., SAT and Terman Concept Mastery Test).

E. SUMMARY

The Zuckerman Sensation-Seeking Scale (SSS) was examined in relation to a number of other measures: Preferences for "volunteering" for unusual experiments expressed as scores on an Unusual Experiments Scale (UES), devised for this study; the D, Pd, and Pt Scales of the MMPI and the Taylor Manifest Anxiety Scale (At); and the Barron-Welsh Art Test (BW). Results showed that SSS was significantly related to UES and had a high negative r with D and insignificant r's with other MMPI scales and At. Although relationships between SSS and BW are complicated by significant sex differences on BW, "complex" BW subjects, whether male or female, make significantly higher SSS scores than "simple" BW subjects.

REFERENCES

1. BARRON, F. Personality style and perceptual choice. *J. Personal.*, 1952, **20**, 385-401.
2. ———. Complexity-simplicity as a personality dimension. *J. Abn. & Soc. Psychol.*, 1953, **48**, 163-172.
3. ———. Some personality correlates of independence of judgment. *J. Personal.*, 1953, **21**, 287-297.
4. BARRON, F., & WELSH, G. S. Artistic perception as a possible factor in personality style: Its measurement by a Figure Preference Test. *J. of Psychol.*, 1952, **33**, 199-203.
5. BERLYNE, D. E. Conflict, Arousal, and Curiosity. New York: McGraw-Hill, 1960.
6. ———. Motivational problems raised by exploratory and epistemic behavior. In S. Koch (Ed.), *Psychology, a Study of a Science* (*Vol. 5*). New York: McGraw-Hill, 1963. Pp. 284-364.
7. BIERI, J. Complexity-simplicity as a personality variable in cognitive and preferential behavior. In D. W. Fiske & S. R. Maddi (Eds.), *Functions of Varied Experience*. Homewood, Ill.: Dorsey Press, 1961. Pp. 355-379.
8. BRACKBILL, G., & LITTLE, K. B. MMPI correlates of the Taylor scale of manifest anxiety. *J. Consult. Psychol.*, 1954, **18**, 433-436.
9. DAHLSTROM, W. G., & WELSH, G. S. An MMPI Handbook. Minneapolis, Minn.: Univ. Press, 1960.
10. ERIKSEN, C. W., & DAVIDS, A. The meaning and clinical validity of the Taylor anxiety scale and the hysteria-psychasthenia scales from the MMPI. *J. Abn. & Soc. Psychol.*, 1955, **50**, 135-137.
11. FISKE, D. W., & MADDI, S. R. A conceptual framework. In D. W. Fiske & S. R. Maddi (Eds.), *Functions of Varied Experience*. Homewood, Ill.: Dorsey Press, 1961. Pp. 11-56.
12. FRUMKIN, R. M. Sex, familiarity, and dogmatism as factors in painting preferences. *Percept. & Motor Skills*, 1963, **17**, 12.

13. Goodstein, L. D. Regional differences in MMPI responses among male college students. *J. Consult. Psychol.*, 1954, **18**, 437-441.

14. Hebb, D. D. Drives and the C.N.S. (conceptual nervous system). *Psychol. Rev.*, 1955, **62**, 243-254.

15. Holt, R. R., & Goldberger, L. G. Assessment of individual resistance to sensory isolation. In B. E. Flaherty (Ed.), *Psychophysiological Aspects of Space Flight*. New York: Columbia Univ. Press, 1961. Pp. 248-262.

16. Knapp, P. H., & Wulff, A. Preferences for abstract and representational art. *J. Soc. Psychol.*, 1963, **60**, 255-262.

17. Leuba, C. Toward some integration of learning theories: The concept of optimal stimulation. *Psychol. Rep.*, 1955, **1**, 27-33.

18. Maddi, S. R. Exploratory behavior and variation-seeking in man. In D. W. Fiske & S. R. Maddi (Eds.), *Functions of Varied Experience*. Homewood, Ill.: Dorsey Press, 1961. Pp. 253-277.

19. Moyles, E. W., Tuddenham, R. D., & Block, J. Simplicity/complexity or symmetry/asymmetry? A reanalysis of the Barron-Welsh Art Scales. *Percept. & Motor Skills*, 1965, **20**, 685-690.

20. Norman, R. D., & Redlo, M. MMPI personality patterns for various college major groups. *J. Appl. Psychol.*, 1952, **36**, 404-409.

21. Siegel, S. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956.

22. Zuckerman, M. The development of an affective adjective check list for the measurement of anxiety. *J. Consult. Psychol.*, 1960, **24**, 457-462.

23. Zuckerman, M., Schultz, D. P., & Hopkins, T. R. Sensation seeking and volunteering for sensory deprivation and hypnosis experiments. *J. Consult. Psychol.*, 1967, **31**, 358-363.

24. Zuckerman, M., Kolin, E. A., Price, L., & Zoob, I. Development of a sensation-seeking scale. *J. Consult. Psychol.*, 1964, **28**, 477-482.

25. Zuckerman, M., Lubin, B., Vogel, L., & Valerius, E. The measurement of experimentally induced affects. *J. Consult. Psychol.*, 1964, **28**, 418-425.

26. Zuckerman, M., Persky, H., Link, K. E., & Basu, G. K. Experimental and subject factors determining responses to sensory deprivation, social isolation, and confinement. *J. Abn. & Soc. Psychol.*, 1968, **73**, 183-194.

27. Zuckerman, M., Persky, H., Hopkins, T. R., Murtaugh, T., Basu, G. K., & Schilling, M. Comparison of stress effects of perceptual and social isolation. *Arch. Gen. Psychiat.*, 1966, **14**, 356-365.

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LEVELS OF PERSONAL CONFLICT DERIVED FROM RESPONSE TO THE EMOTION PROFILE INDEX*[1,2]

Central Islip State Hospital, New York

CHARLES SHEPPARD, CAROLYN O'NEILL, JOHN FRACCHIA, AND SYDNEY MERLIS

A. INTRODUCTION

Kellerman and Plutchik (4), reporting on one aspect of the relationship between personality and emotion—namely, conflict—propose a taxonomy of trait terms designed to measure high, medium, and low conflict tendencies from EPI responses. Hypothesizing that a person's choices among these terms reflect levels of maladjustment, Kellerman and Plutchik (4) present data indicating normal *S*s, moderately ill, and severely ill *S*s obtain significantly different scores on each of the three conflict scales derived from the trait term taxonomy. Their findings show normals scored higher than the two maladjusted groups on the low conflict scale, while the greatest medium conflict scores and high conflict scores were achieved by the moderately ill and severely ill groups respectively.

The present study seeks to extend EPI conflict research by applying Kellerman and Plutchik's (4) conflict measures to the EPI responses of MMPI identified pathological personality types which clinically suggest varying degrees of conflict. In this way additional information as to the relative sensitivity of these newly developed conflict scales to expected differences in the level of conflict associated with different personality structures can be obtained.

B. METHOD

Data were obtained from newly admitted male narcotic addicts and chronic schizophrenic patients who differed with regard to the nature and duration of mental illness and length of hospitalization.

All patients completed a social history form and a battery of psychological tests.[3] The narcotic users completed the battery within five days of their hospitalization. The chronic schizophrenic group completed the battery as part of a routine testing procedure for admission to a psychopharmacological study. Included in the test battery were Raven Progressive Matrices—RPM (8); the Minnesota Multiphasic Personality Inventory—MMPI (2); and the Emotions Profile Index—EPI (3, 4); the Institute of Personality and Ability Testing, 8-Parallel-Form Anxiety Battery Form A—IPAT-8-A (9).

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[2] We wish to thank Robert Plutchik, Ph.D., Mrs. Hope Conte, M.A., and Herbert Landau, B.A., for their constructive review of an earlier draft of this manuscript.

Of the patients hospitalized for drug abuse, two subsamples were selected on the basis of MMPI profile patterns. The rules for profile patterns as set down by Gilberstadt and Duker (1), Marks and Seeman (5), and Meehl and Dahlstrom (6) were observed in classifying MMPI records. Included in the groups for further study were those defined by 49′ MMPI pattern ($N = 35$) and those having five or more scales exceeding a T score of 70 and an F scale score less than 80 ($N = 33$). The latter group will be referred to as the five high scales group (5HS). The 49′ and 5HS patterns are typically considered to be indicative of primary sociopathic and schizotypic personality structures respectively.

The sample of chronic schizophrenic patients ($N = 31$) was selected to represent a group who have been separated from the society for a longer period of time than the narcotic user. For this reason the patients in the chronic group are significantly older than the patients in either narcotic user groups. They represent a heterogeneous group based upon admission diagnosis and MMPI profile type (mean MMPI pattern of 8′2). The contribution of this group lies mainly in terms of the long term duration of a clinically diagnosed psychotic illness.

Table 1 shows differences in character structure among the sociopathic narcotic user (49′), the schizotypic narcotic user (5HS)[4] and the chronic schizophrenic group. The chronic schizophrenic group differs from both narcotic user groups in terms of length of illness as reflected in duration of hospitalization. See Table 1.

A quantitative estimate of the severity of maladjustment for the three MMPI profile patterns was obtained by averaging T scores on the 10

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[3] We would like to thank Francis J. O'Neill, M.D., Leslie Eber, M.D., and Geraldine Burkic, M.A., for their cooperative efforts in making the patients available for testing. We thank Miss Lucy Lemmer, Sue Rosenberg and Mrs. Rita Kaplan for their assistance in testing the patients.

[4] We wish to thank C. H. Ammons, Ph.D., and R. B. Ammons, Ph.D., Editors of *Psychological Reports* and Southern Universities Press for their permission to reproduce these data (10). We wish to thank Fredrick C. Thorne, M.D., Ph.D., Editor of the *Journal of Clinical Psychology* for permission to reproduce these data (11).

TABLE 1

MEAN AGE, EDUCATION, YEARS USING HEROIN, RPM AND IPAT CENTILES, AND MMPI T SCORES, STANDARD DEVIATIONS, F RATIOS, AND LEVELS OF PROBABILITY FOR THE THREE GROUPS TESTED

Measure	Sociopathic or 49′ Pattern ($N = 35$) $\bar{X}$ (years)	δ	Schizotypic or 5HS Pattern ($N = 33$) $\bar{X}$ (years)	δ	Chronic schizophrenics or 8′2 Pattern ($N = 31$) $\bar{X}$ (years)	δ	F	p
Age	30	7	28	6	52	7	74.35	$<.001$
Education	10	2	9	2	10	3	1.25	NS
Heroin use or hospitalization	11	5	8	5	17	12	—	—
Raven's centile	59	25	42	26	48	33	3.01	NS
IPAT Ax centile	37	28	61	27	34	27	8.80	$<.001$
MMPI Validity Scales								
L	49	8	51	8	61	11	16.69	$<.001$
F[a]	06	4	14	3	12	10	13.79	$<.001$
K	52	8	47	7	56	11	8.04	$<.001$
Hypochondriasis	52	8	69	13	60	15	17.18	$<.001$
Depression	58	9	81	10	69	13	37.06	$<.001$
Hysteria	52	8	67	10	56	13	18.91	$<.001$
Psychopathic deviate	76	8	83	10	64	12	30.40	$<.001$
Masculinity-Femininity	56	10	64	9	60	7	5.61	$<.01$
Paranoia	52	6	69	10	63	15	20.46	$<.001$
Psychoasthenia	55	6	78	9	60	13	51.93	$<.001$
Schizophrenia	55	4	84	10	72	18	48.26	$<.001$
Hypomania	71	6	73	10	62	13	10.58	$<.001$
Social introversion	48	6	60	10	53	8	18.40	$<.001$
Ego strength	55	4	42	8	51	9	23.94	$<.001$
Taylor Manifest Anxiety Score[a]	14	6	26	7	14	9	26.11	$<.001$

[a] Raw score.

MMPI scales for each S ("overall pathology score," OPS) and calculating the mean OPS for each group. The average OPS's for the 49′, 8′2, and 5HS profiles were 58, 61, and 73 respectively. Although MMPI T scores are not typically averaged across scales, it was felt this index would provide an approximate guide to the level of individual and group maladjustment. Analysis of variance indicated significant OPS differences among the groups ($F = 56.48$, $p < .01$). The 5HS group had a significantly higher OPS than either the 49′ or 8′2 groups ($t = 15.62$, $p < .001$; $t = 6.47$, $p < .001$). The nonsignificant OPS mean differences for the 49′ and 8′2 patterns suggest these groups represent equally severe but qualitatively different personality disorders. To the extent that "more maladjusted individuals would choose trait terms . . . which indicate greater conflict" (4, p. 1108), the 5HS group would be expected to score significantly higher than the 49′ and 8′2 groups on the high EPI conflict scale. The 49′ and 8′2 groups' scores should be significantly higher in the medium and low conflict scales than those of the 5HS group.

With the differences in personality types, severity of disorder, and duration of illness defined, attention was directed to measuring degree of conflict from EPI response. The technique followed was to rescore EPI's for low, medium, and high conflict in the manner described by Kellerman and Plutchik (4, p. 1109). Analysis of variance was applied to test the significance of mean differences among the three groups on these conflict measures.

C. RESULTS

Table 2 shows the mean EPI percent scores for the prototypic dimensions, average conflict scale scores, and the *F* ratios and the oneway analysis of variance performed for each dimension and conflict scale. See Table 2.

TABLE 2

MEAN EPI PERCENTAGE SCORES FOR THE NINE DIMENSIONS, HIGH, MEDIUM, AND LOW CONFLICT MEASURES, STANDARD DEVIATIONS, *F* RATIOS, AND LEVELS OF PROBABILITY FOR THE THREE STUDY GROUPS

Measure	Sociopathic or 49′ Pattern ($N = 35$)		Schizotypic or 5HS Pattern ($N = 33$)		Chronic schizophrenics or 8′2 Pattern ($N = 31$)			
	$\overline{X}$	δ	$\overline{X}$	δ	$\overline{X}$	δ	F	p
Incorporation	70	21	57	24	69	18	3.9	.05
Reproduction	72	18	61	23	70	19	2.8	NS
Destruction	22	17	31	18	29	13	3.0	NS
Exploration	62	12	61	12	59	14	.30	NS
Rejection	31	15	41	18	38	12	4.0	.05
Deprivation	29	16	41	21	31	19	3.8	.05
Protection	59	13	54	19	60	15	1.2	NS
Orientation	59	15	52	17	49	15	3.1	.05
Bias	74	15	62	17	70	16	5.0	.01
High conflict[a]	17	4	18	6	16	4	1.41	NS
Medium conflict[a]	09	4	10	4	11	4	1.83	NS
Low conflict[a]	17	5	15	5	17	5	1.63	NS

[a] Raw score.

The conflict scale data indicate insignificant high, medium, and low conflict scale differences among the three profile groups with the pattern of mean scores being essentially similar for each personality type. Thus the sensitivity of the EPI conflict scales was not confirmed in these samples which differed with regard to nature and severity of maladjustment.

D. DISCUSSION

EPI conflict measures can also be extracted from the relative strengths and mixtures of prototypic dimensions (7). This can be done by computing difference scores on polar opposite dimensions, since ". . . it is possible to consider the mixture of opposites or near opposites as producers of conflict. In general, combining opposites produces maximum conflict" (4, p. 1107). When this model is used for conflict measurement, the smaller the difference score; the greater is the indication of conflicting emotional patterns. When mean bipolar difference scores (BDS) for the four opposite pairs of primary emotions are computed, the smallest difference (30.0) and hence greatest conflict is found in the 5HS group. The greatest difference (lowest conflict) (38.0) occurs in the 49′ pattern, one usually interpreted as a primary sociopathic profile. Clinically, sociopaths might be expected to manifest less guilt and therefore less emotional conflict from this source than the other types of personality dysfunctions. It may be BDS's are somewhat more sensitive to magnitude of emotional turmoil than the recently developed conflict scales.

It is also interesting to note that if BDS's are computed from the mean EPI percentage scores reported by Kellerman and Plutchik (4) for their moderately and severely ill *S*s, the former (11.0) rather than the latter (30.0) *S*s show the most conflict in this measure. Thus some inconsistencies between the two methods of determining emotional conflict from EPI self-report are indicated. Further comparisons of these conflict indices along a quantitatively defined continuum of maladjustment appear necessary to clarify or resolve the apparent discrepancies between the two EPI conflict assessment techniques.

E. SUMMARY

Narcotic users comprising two distinct diagnostic groups defined by MMPI profile types as sociopathic (49′) and schizotypic (5HS), and a chronic schizophrenic group (8′2 MMPI profile pattern) were selected to cross-validate a taxonomy of trait terms designed to measure high, medium, and low conflict from Emotion Profile Index (EPI) responses. The sensitivity of the EPI conflict scales was not confirmed in these samples which differed significantly with regard to type and severity of maladjustment. Implications

of other data were discussed within the rubric of the multifactor analytic theory of emotion and for possible future use of the EPI.

REFERENCES

1. GILBERSTADT, H., & DUKER, J. A Handbook for Clinical and Actuarial MMPI Interpretation. Philadelphia, Pa.: Saunders, 1965.
2. HATHAWAY, S. R., & MCKINLEY, J. Minnesota Multiphasic Personality Inventory Manual. New York: Psychological Corp., 1951.
3. KELLERMAN, H., & PLUTCHIK, R. Manual for Emotions Profile Index. Hempstead, N.Y.: Hofstra Univ. Press, 1966.
4. ———. Emotion-trait interrelations and the measurement of personality. *Psychol. Rep.*, 1968, **23**, 1107-1114.
5. MARKS, P. A., & SEEMAN, W. The Actuarial Description of Abnormal Personality. Baltimore, Md.: Williams & Wilkins, 1963.
6. MEEHL, P. E., & DAHLSTROM, W. G. Objective configural rules for demonstrating psychotic from neurotic MMPI profiles. *J. Consult. Psychol.*, 1960, **24**, 375-387.
7. PLUTCHIK, R. The Emotions, Facts, Theories and a New Model. New York: Random House, 1962.
8. RAVEN, J. C. Guide to the Standard Progressive Matrices, ABCD and E. London, England: H. K. Lewis, 1960 (Distr. in U.S. by Psychological Corp.).
9. SCHEIER, I. H., & CATTELL, R. B. Handbook and Test Kit for the IPAT 8-Parallel Form Anxiety Battery. Champaign, Ill.: Inst. of Personality and Ability Testing, 1960.
10. SHEPPARD, C., FIORENTINO, D., & MERLIS, S. Affective differential: Comparison of emotion profiles gained from clinical judgment and patient self-report. *Psychol. Rep.*, 1968, **22**, 809-814.
11. SHEPPARD, C., FIORENTINO, D., COLLINS, L., & MERLIS, S. Comparison of emotion profile types in male narcotic addicts. *J. Clin. Psychol.*, 1969, **25**, 186-188.

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OTHER BEHAVIOR: CONSEQUENCES OF REINFORCING NOT RESPONDING*[1]

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A. INTRODUCTION

Most reinforcement schedules prescribe the delivery of a reinforcing stimulus following a response, but one schedule, DRO, is unique in providing the stimulus whenever a certain response is not emitted for a specified period of time. Perhaps the uniqueness of DRO is responsible for the prevailing definition of the schedule in terms of assumed process rather than in terms of experimental manipulations. The definition of DRO as "differential reinforcement of other responding" (7) is more common than the alternatives of "differential reinforcement of no responding" (5) and "differential reinforcement of pausing" (4), although the alternatives are more objective descriptions of the schedule itself. No data show that DRO schedules do condition other behavior when they succeed in decreasing the frequency of a specified response; in fact, there appears to be no research on this question. Note, however, the difficulty of investigating whether conditioning of some "other" response will occur, and if it does of knowing what behavior has been strengthened. Because the responses are unpredictable, the experimenter cannot establish appropriate objective recording techniques in advance. Instead, as in Skinner's (9) classic study of adventitious effects of reinforcement, the experimenter must try to identify the behavior after it develops and then attempt to measure and manipulate it. A potential solution to this problem is to structure the situation so that the hypothesized adventitiously-reinforced response may be specifiable in advance (3). If a response is already occurring at a substantial frequency, it is likely to be present when reinforcements occur and should maintain or increase its frequency through the consequent, albeit accidental, correlations with reinforcement. This rationale generated the present design for investigating whether

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"other" behavior would be reinforced with DRO schedules when only the absence of a certain response produced reinforcement.

B. METHOD

1. *Subjects*

The subjects were six preschool children ranging in age from four to five years.

2. *Apparatus*

The experimental room was a booth, 70 inches long by 40 inches wide. Two 38mm diameter response keys were mounted on the front wall. The one on the left was transilluminated by red lamps, the one on the right by blue lamps. An M & M dispenser (R. Gerbrands Co.) delivered M & M candies into a tray centered 255mm beneath the two keys. A chime sounded simultaneously with the operation of the dispenser.

A 75w bulb in a glass-enclosed fixture centered on the ceiling provided the only illumination besides that coming from the keys. White noise delivered by a loudspeaker placed near the ceiling helped to mask extraneous sounds. All procedures were fully automated.

3. *Procedure*

On the first session, the subject was brought into the experimental room and seated in front of the response keys. The experimenter pressed each key and told the subject that pressing would earn a piece of candy. The child also was told that not every press would produce candy, but that the candy, when obtained, could either be eaten immediately or be saved. (By the end of the experiment, candy could also be traded for small toys or games.) The experimenter then left the child alone in the booth and turned on the apparatus.

The experiment was conducted in three phases. Phase 1 (FR phase) established the responses which later were to have either a dependent or an independent relation to reinforcement. Pressing either of the two keys provided a piece of candy for every fixed number of presses of either or both keys (fixed-ratio schedule). The fixed-ratio (FR) was increased in small increments from FR 1 to FR 30 so that by the second or third session each child had a full session of FR 30.

The second phase began on the session after the complete session with FR 30 and studied the effects of DRO schedules. The first session of Phase 2 began with an FR 30 schedule, but after 10 candy deliveries the schedule was changed so that responses on the red (left) key had no effect (extinction schedule), and *not responding* on the blue (right) key for a specified period of time operated the candy dispenser (DRO schedule). The DRO interval began at six seconds and was raised to as long as 60 seconds by the ninth session when Phase 2 ended; the DRO values increased during each session, and were never lower than 20 seconds after the third session of the phase.

The third phase began on the last day (Session 10) when the schedule was changed so that all responses were ineffective and candy was not available. The first nine sessions ended with the delivery of 30 candies; Session 10 continued for 15 minutes.

C. Results and Discussion

Figure 1 shows the rate of responding on each key during the 10 sessions. The response rates on each key were nearly equal on the days of the FR phase. Responses usually alternated with some children changing keys after each response and others after each candy delivery. The substantial rates indicated that pressing both keys had a high probability of occurrence. During Phase 2 responding on the blue DRO key declined in frequency indicating that the children were controlled by the DRO specification of not pressing as the requirement for reinforcement. Because not responding on the DRO key was shaped by gradually increasing the DRO interval whenever *S*s stopped responding, the terminal rates with each DRO value were zero. Responses on the blue key appeared in bursts that became less frequent with successive sessions.

Of primary interest was the other behavior while the DRO schedule was providing all of the reinforcements. The plan that extinction-key pressing be probable prior to DRO reinforcement successfully established that response as the "other" behavior for most subjects, but different responses predominated for the rest. Although pressing the red panel was irrelevant to the presentation of candy, four of the six children responded on it at as high or at even a higher rate than had occurred when the presses produced candy on the fixed-ratio schedule (Figure 1). Figure 2 shows that by the last day of Phase 2 three children responded on the red key at a steady rate, except after the delivery of a piece of candy when they paused. The fourth child had periods of pressing interrupted by pauses. The various records were not unlike those of children's responses maintained on fixed-interval schedules (6).

The remaining two children did not continue to press the red panel but

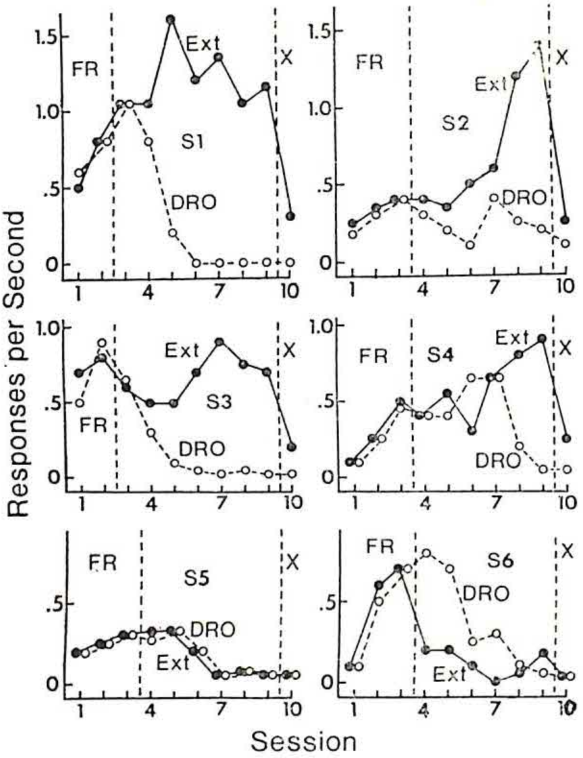

FIGURE 1

Rate of Responding in Each Phase

Keys are identified by whether they were correlated with extinction (filled points) or DRO (open points) in Phase 2. Phases are designed by their schedules: FR = fixed-ratio schedule of Phase 1, DRO and Ext = both schedules of Phase 2, and X = extinction schedules of Phase 3.

stopped operating either key. However, these children also displayed consistencies in behavior. One child, S5, sat quietly and watched the tray, picking up each piece of candy as it appeared. This subject had alternated successive responses between keys in Phase 1, and had, in the first three sessions of Phase 2, usually received candy on the DRO schedule in a period of resting following extended intervals of unreinforced responding on each panel alternately. The second subject, S6, explored the room and the floor between reinforcements, and approached the tray immediately upon the delivery of a piece of candy. During Phase 1, S6 had alternated keys after candy deliveries. In Phase 2, after receiving a reinforcer following several responses on the extinction key, S6 responded for long periods on the DRO key before

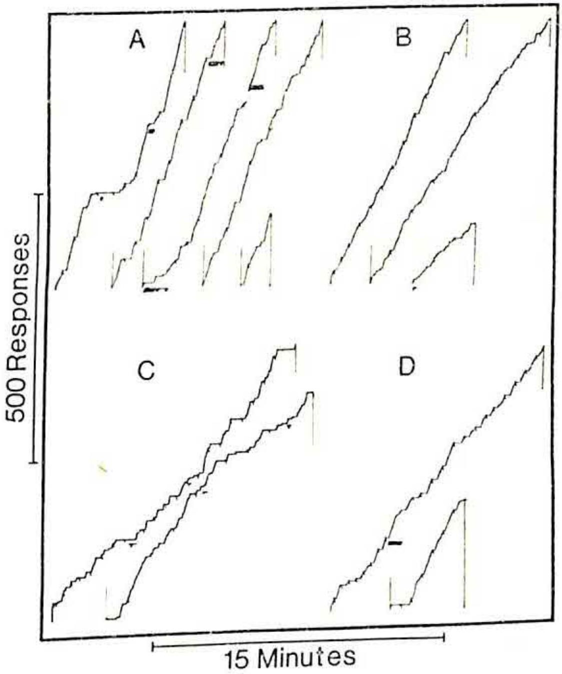

FIGURE 2

CUMULATIVE RECORDS OF FOUR SUBJECTS FOR THE LAST DAY OF PHASE 2

Responses on the red extinction key cumulated while responses on the blue DRO key operated the event pen whose traces appear under the cumulative records. DRO key traces are omitted when there were extended periods without responses. Displacements of the red-key response marker show reinforcements.

pausing long enough for reinforcement to occur. On the third day of Phase 2 he received several pieces of candy while searching on the floor for a dropped piece; afterwards, the time spent in exploration increased. Thus, for both children, the behavior prevalent at the time of DRO reinforcement became predominant. For all subjects, therefore, the DRO schedules simultaneously reduced the rate of pressing the blue key, the response whose absence was prerequisite for reinforcement, and maintained additional "other" behavior that was irrelevant to the delivery of reinforcement. Perhaps, as in the case of S6, the "other" behavior facilitated not pressing the DRO key and thereby influenced the frequency of consequent reinforcements, but this possibility cannot be evaluated from the present data.

As Figure 1 shows, in the third phase the four children who had pressed the red panel at a substantial rate with the DRO schedule slowed markedly. They stopped pressing completely by the end of the session. The characteristic behavior of the other two children also changed: S5 watched the candy tray less and began rising from the chair, exploring the room, and asking when the session would end; S6 now spent less time moving around the room but played with his clothes, touched the keys lightly, or played with the candy tray while sitting in the chair. Since the "other" responses changed with extinction as the only schedule in force, the persistent behavior in Phase 2 depended on the candies received for not pressing the panel correlated with the DRO schedule. The reinforcements controlled responding even though the behavior had only an accidental and often a delayed temporal relation to the delivery of candy.

The occurrence of stereotyped behavior which did not produce reinforcement has also been observed with schedules other than DRO (1, 2, 8, 10). The generality of this phenomenon suggests that the simultaneous strengthening of several responses, some deliberately and some accidentally, is not a special characteristic of any schedule but may be a general consequence of reinforcement. Because the various responses can be of different types and/or topographies (e.g., key-pressing and not key-pressing, operating different switches, bar-pressing and running, etc.), the implication is that the "irrelevant" and "relevant" responses are strengthened independently rather than through induction from one to the other. The variability in the character of the adventitiously-reinforced responses among subjects is perhaps inevitable, since the nature of such responses is not specified by the reinforcement schedule and can vary without affecting reinforcement. If conditionable aspects of behavior are free to vary prior to reinforcement, and if the presentation of reinforcement dependent on a response also usually conditions other responses, it may be that adventitious reinforcement is at least partially responsible for the individual differences often observed in behavior.

D. Summary

Children first received candy for pressing both a red and a blue key, but next only earned candy when they did not press the blue key for a specified period of time. Although the *S*s stopped responding on the blue key with this schedule, they either continued to press the red key at a high rate or emitted other stereotyped behavior. All pressing stopped during a third phase in which no candies could be obtained. The "irrelevant" behavior when reinforcements depended on not pressing the blue key was maintained by accidental correlations of the behavior with reinforcement.

REFERENCES

1. BRUNER, A., & REVUSKY, S. H. Collateral behavior in humans. *J. Exper. Anal. Behav.*, 1961, **4**, 349-350.
2. CATANIA, A. C., & CUTTS, D. Experimental control of superstitious responding in humans. *J. Exper. Anal. Behav.*, 1963, **6**, 203-208.
3. HERRNSTEIN, R. J. Superstition: a corollary of the principles of operant conditioning. In W. K. Honig (Ed.), *Operant Behavior: Areas of Research and Application.* New York: Appleton-Century-Crofts, 1966. Pp. 33-51.
4. KELLEHER, R. T. Schedules of conditioned reinforcement during experimental extinction. *J. Exper. Anal. Behav.*, 1961, **4**, 1-5.
5. LANE, H. Operant control of vocalizing in the chicken. *J. Exper. Anal. Behav.*, 1961, **4**, 171-177.
6. LONG, E. R., HAMMACK, J. T., MAY, F., & CAMPBELL, B. J. Intermittent reinforcement of operant behavior in children. *J. Exper. Anal. Behav.*, 1958, **1**, 315-339.
7. REYNOLDS, G. S. Behavioral contrast. *J. Exper. Anal. Behav.*, 1961, **4**, 57-71.
8. SIDMAN, M. By-products of aversive control. *J. Exper. Anal. Behav.*, 1958, **1**, 265-280.
9. SKINNER, B. F. "Superstition" in the pigeon. *J. Exper. Psychol.*, 1948, **38**, 168-172.
10. SKINNER, B. F., & MORSE, W. H. Concurrent activity under fixed-interval reinforcement. *J. Comp. Physiol. Psychol.*, 1957, **50**, 279-281.

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THE BIRTH WEIGHT OF CHILDREN BORN TO SCHIZOPHRENIC WOMEN*[1]

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A. INTRODUCTION

Previous studies (2, 8) have reported on the physical inferiority of offspring of schizophrenic women without adequate control groups, even though it is well-known that schizophrenics are predominantly from the lower classes (1), and that prematurity, infant mortality, malformation, and low birth weight are related to such factors as socioeconomic level, race, nutrition, and prenatal care (7).

The present study compared the birth weights of children of schizophrenic women with national samples matched on socioeconomic level and race. It also compared the birth weights of children of schizophrenic mothers with the birth weights of children of schizophrenic fathers. As both socioeconomic level and schizophrenia itself were controlled in this comparison, any differences found between the two groups would indicate the part played by prenatal environment rather than genetics.

B. METHOD

Names of married, divorced, and widowed schizophrenic subjects and their children were available from an ongoing study of the intelligence of children of schizophrenics. Parents had attended Cleveland Public Schools as children and had been hospitalized in a public mental hospital in Cleveland as adults. A large majority of them came from the poorer neighborhoods of Cleveland.[2] Names and birthdates of children were obtained from records of the Cleveland Social Service Clearing House. Birth weights of all children born in Cleveland since 1945 were available from birth certificates at the Bureau of Vital Statistics at Cleveland City Hall. Birth weights of some

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[2] For a more detailed discussion of the method of obtaining schizophrenic subjects see Lane and Albee (5).

children who were born before 1945 were obtained from four large general hospitals.

The final group of subjects consisted of 66 schizophrenic mothers—29 white and 37 Negro—and their 162 children, and 45 schizophrenic fathers—23 white and 22 Negro—and their 119 children. Six sets of twins, three with schizophrenic mothers and three with schizophrenic fathers, were included.

C. Results and Discussion

The results showed nothing abnormal about the birth weights of children born to schizophrenic women. Although their mean birth weight of 3140 grams was somewhat less than the overall national average of 3280 grams,[3] it was very similar to the national average of 3130 grams for nonwhites who made up the majority of the present sample. When both race and economic level were matched, as shown in Table 1, the mean birth weights and the distribution of birth weights were very comparable for children of schizophrenic mothers and children nationwide, with the possible exception of a somewhat lower proportion of babies weighing over 4000 grams for the present sample of Negro schizophrenics.

TABLE 1
Birth Weights in Grams of Children of Schizophrenic Mothers, Schizophrenic Fathers, and National Averages

			Percent distribution of weight				
Children	*N*	Mean birth wt.	2500 or less	2501-3000	3001-3500	3501-4000	4001 or more
Totals							
Schiz. mother	162	3140	10.5	27.8	38.9	20.4	2.5
Schiz. father	119	3080	12.4	24.4	40.3	19.3	3.4
Low income U.S.	—	3180	10.4	21.6	39.2	23.2	5.6
White							
Schiz. mother	57	3220	10.5	21.0	35.1	28.0	5.3
Schiz. father	54	3260	12.9	14.8	42.6	22.2	7.4
Low income U.S.	—	3200	8.8	20.1	38.9	26.3	5.9
Nonwhite							
Schiz. mother	105	3100	10.5	31.4	40.9	16.2	.9
Schiz. father	65	2930	12.3	32.3	38.4	16.9	.0
Low income U.S.	—	3080	14.0	25.0	39.8	16.2	5.0

The mean birth weight of children born to schizophrenic women was also similar to the mean birth weight found earlier for schizophrenics themselves

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[3] All national statistics are from National Center for Health Statistics (6).

(5): 3140 grams and 3180 grams, respectively. The adult schizophrenic sample was drawn from the same population, as was the present parent sample, and included some of them.

Even those pregnancies most directly associated with the schizophrenic disorder did not result in infants of lowered birth weights. The average birth weight of 38 children who were born after or within two months before their mothers' diagnoses of schizophrenia was 3162 grams.

The fact that children of schizophrenic women did not weigh less at birth than children of schizophrenic men (see Table 1) is clear evidence that the prenatal environment provided by schizophrenic mothers has no effect on birth weight specific to schizophrenia. The mean birth weight of eight children from two families, both Negro, in which both mothers and fathers had been diagnosed as schizophrenic, and which were not included in the previous calculations, was 3030 grams, with a range of 2640 grams to 4000 grams. So small a sample suggests that even children with two schizophrenic parents weigh nearly the same as national averages of similar racial and socioeconomic background.

Further evidence that birth weights of children of schizophrenic mothers are not below average is that schizophrenic mothers bear significantly more female than male children (3, 9) and that girls generally weigh less at birth than boys (6). In the present sample group averages were lowered because 96 daughters of schizophrenic women weighed an average of 3033 grams at birth while 66 sons of schizophrenic women had a mean birth weight of 3255 grams. A report that the usual difference in birth weight in favor of the male is reversed for children of schizophrenic mothers (10) was not confirmed.

REFERENCES

1. HOLLINGSHEAD, A. B., & REDLICH, F. C. Social Class and Mental Illness. New York: Wiley, 1958.
2. KALLMAN, F. J. The Genetics of Schizophrenia. New York: J.J. Augustin, 1938.
3. LANE, E. A. The sex ratio of children born to schizophrenics and a theory of stress. *Psychol. Record,* 1969, **19**, in press.
4. LANE, E. A., & ALBEE, G. W. Childhood intellectual performance of adult schizophrenics. *J. Abn. & Soc. Psychol.,* 1963, **67**, 186-189.
5. ———. The comparative birth weights of adult schizophrenics and their siblings. *J. of Psychol.,* 1966, **64**, 227-231.
6. NATIONAL CENTER FOR HEALTH STATISTICS. Variations in birth weight, legitimate live births, United States 1963. Series 22, Number 8, U.S. Public Health Service, Washington, D.C., November 1968.
7. SHAPIRO, S., SCHLESINGER, E. R., & NESBITT, R. D., JR. Infant, Prenatal, Maternal, and Childhood Mortality in the United States. Cambridge, Mass.: Harvard Univ. Press, 1968.

8. SOBEL, D. E. Infant mortality and malformations in children of schizophrenic women. *Psychiat. Quart.*, 1961, **35**, 60-65.
9. TAYLOR, M. A. Sex ratios of newborns: Associated with prepartum and post partum schizophrenia. *Science*, 1969, **164**, 723-724.
10. YARDEN, P. E., & SURANYI, I. The early development of institutionalized children of schizophrenics. *Dis. Nerv. Syst.*, 1968, **29**, 380-384.

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MODIFICATION OF INFANT STATE BY TREATMENT IN A ROCKERBOX*[1, 2]

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A. Introduction

When a distressed infant is rocked, he often ceases his fretful behavior. The practice of rocking in the arms, cradle, or cradle-substitute is widely distributed among diverse social and cultural groups (7). The generality of this practice and its apparent effectiveness implies the existence of some common environmental or organismic antecedent.

An environmental conceptualization of distress inhibition suggests some variant of secondary reinforcement associated with gratification of primary needs (4, 9). An organismic explanation implies some biophysically-linked response largely independent of specific training or experience (3, 5).

The learning paradigm presumes that response probability varies with reinforcement history. The model suggests the importance of parental practices relating to rocking and infant age as an index of cumulative reinforcement. When parental practices are appropriate, response strength increases with time. The organismic view, in contrast, implies the relative universality of the response for maturationally similar infants, independence of specific training, and variation with biophysical state.

B. Method

1. *Subjects*

Subjects were 32 infants divided into four equal groups aged 2-4, 10-12, 18-20, and 26-28 weeks, balanced for sex composition. The birthdates for cohorts ranged from January to August, 1968. The sample represented a cross-section of occupational and socioeconomic classifications.

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[2] The author expresses his gratitude to those who assisted during various phases of the study including Eleanor Shimkin and Diane Taylor, raters; Mrs. Joyce Lohman, research assistant; Mrs. Donna Davis and Dr. James Wardrop, computer assistance. Mrs. Lohman's Master's thesis was derived from data collected in this study under the supervision of the author.

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2. *Apparatus*

A 32-inch square, motor-driven, wooden platform with four-inch sides (the rockerbox) was constructed. When engaged, the rockerbox oscillated with a standard horizontal displacement of three inches 30 times per minute at slow speed and 60 times per minute at high speed.

3. *Procedure*

a. Description of covariates. Five variables of probable significance to the previous theoretical discussion were selected for covariate analysis.

(1). *Interpersonal factors.* The number of older siblings, breast or bottle feeding, and previous rocking experience were ascertained from maternal interview. The latter variables were coded dichotomously to reflect the mother's usual practice.

(2). *Developmental evaluation.* Gesell's developmental examination (6) was administered to each infant and the infant's Developmental Quotient derived.

(3). *Determination of infant state.* Prior to treatments, the infant was placed on his back in the rockerbox and observed for a one-minute period by two independent observers. The observers, hidden from the infant by a one-way mirror, rated his behavior at 30-second intervals for activity level and mood quality (10). These observations served as both a covariate and baseline for treatment effect.

b. Treatment design. Four treatments in random order were administered to each infant. The treatments derived from the combination of high and low rocking speed with mother within or not within the infant's visual field. This combination of factors was designed to provide partial information about the differential effect of rocking speed and the inhibiting or facilitating effect of maternal presence during treatment. Each treatment was one minute in duration followed by a one-minute nontreatment period. During these consecutive periods, the infant was rated for activity level and mood at 30-second intervals by the hidden observers.

C. RESULTS

The experimental design consisted of an analysis of covariance for five independent variables (siblings, feeding practice, rocking experience, DQ, and infant state) and four factors (age, sex, rocking speed, and maternal presence). An analysis of covariance was applied to both activity and mood scales. Since the pooled interrater reliabilities were .86 and .79 for each scale respectively, ratings were pooled for analysis.

1. *Treatment Effect*

The rockerbox treatment had a marked effect on infant state (Figure 1). Infant activity level decreased and distress declined. Although the means for the pre- and post-treatment periods did not differ significantly from one another, the pooled means differed from the treatment period for activity level beyond the .0001 level ($t = 9.6$; 30 *df*) and for mood quality beyond the .001 level ($t = 4.9$; 30 *df*).

2. *Factor Effects*

Although 31 factor combinations were evaluated for each scale, only one factor—speed of rocking—obtained significance for effects during the treatment period. The faster rocking speed was associated with less distress ($p < .01$) and somewhat reduced activity ($p < .05$).

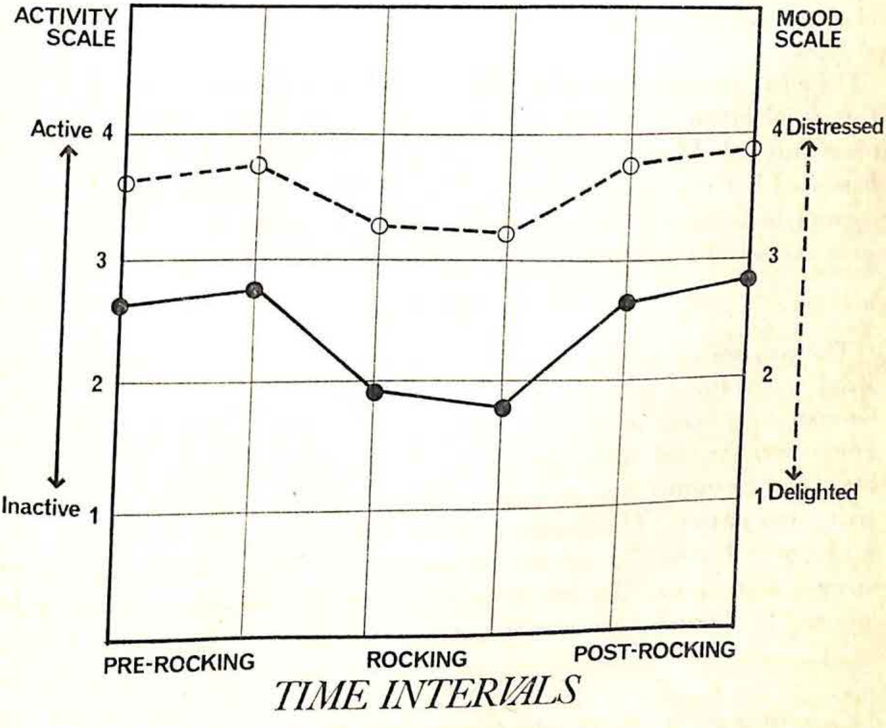

FIGURE 1
THE RELATION OF ROCKING TREATMENT TO ACTIVITY LEVEL AND MOOD

3. *Covariate Effects*

A step-wise regression analysis for five covariates yielded one significant variable. Infant state related to treatment effects for activity level ($p < .0001$) and mood quality ($p < .0001$). Although infant state accounted for approximately 38 percent of post-treatment variance for activity level and 59 percent for mood quality, infant state accounted for only 14 percent of treatment variance for activity level and six percent for mood quality. The more active and distressed the infant, the more effective the treatment.

D. DISCUSSION

The rockerbox effect denotes the inhibition of activity and distress which accompanies rhythmic motion. Two variables were related to this effect: (*a*) The rate of rhythmic motion, and (*b*) infant state. These variables appeared largely independent of age, sex, maternal presence, family size, feeding practice, or social experience of rocking. The potency and generality of the effect and its association with kinesthetic and biophysical variables suggest a biological basis.

The effect appears consistent with an ethological interpretation (1, 2, 8). Distress inhibition by motion suggests a species-specific response which serves infant survival. Motion provides a cue to the infant that he is not alone or abandoned but near some caretaker. The inhibition serves to reward "good" parental behavior and consolidates the maternal-infant bond. The survival value and social significance of the response is obvious though not trivial.

E. SUMMARY

The practice of rocking to quiet a distressed infant occurs among diverse social and cultural groups. Its effectiveness may derive from some learned association or some organismic disposition. Thirty-two infants in four age groups were treated under four conditions in an apparatus called the rockerbox. The treatment was associated with the marked reduction of infant activity and distress. The response varied with rocking rate and infant state, but appeared generally independent of age, sex, DQ, and specific environmental antecedents. The results implied that the rockerbox effect is a biophysically-related, species-specific response which serves infant adaptation.

REFERENCES

1. AINSWORTH, M. D. The development of infant-mother interaction among the Ganda. In B. M. Foss (Ed.), *Determinants of Infant Behavior*. London, England: Methuen, 1963. Pp. 67-112.

2. Bowlby, J. The nature of the child's tie to his mother. *Internat. J. Psychoanal.,* 1958, **39**, 1-34.

3. Carmichael, L. The onset and early development of behavior. In L. Carmichael (Ed.), *Manual of Child Psychology* (2nd ed.). New York: Wiley, 1954. Pp. 60-186.

4. Dollard, J., & Miller, N. E. Personality and Psychotherapy. New York: McGraw-Hill, 1950.

5. Gesell, A. The ontogenesis of infant behavior. In L. Carmichael (Ed.), *Manual of Child Psychology* (2nd ed.). New York: Wiley, 1954. Pp. 335-374.

6. Gesell, A., & Amatruda, C. S. Development Diagnosis (2nd ed.). New York: Hoeber, 1947.

7. Mead, M. Four Families (Parts 1 & 2). New York: McGraw-Hill.

8. Schaffer, H. R., & Emerson, P. E. The development of social attachments in infancy. *Monog. Soc. Res. Child Devel.,* 1964, **94**. Pp. 1-77.

9. Sears, R. R. Dependency motivation. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation:* 1963. Minneapolis: Univ. of Minnesota Press, 1963. Pp. 25-65.

10. Van den Daele, L. D. A bidimensional scale for infant state. Mimeographed paper, University of Illinois, Urbana, Illinois, 1968.

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EVALUATION OF PRESIDENTIAL CANDIDATES AS A FUNCTION OF TIME AND STAGE OF VOTING DECISION*[1]

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A. INTRODUCTION

In every national election there is a small group of people who, during the course of the campaign, suffer a great deal of conflict in reaching a voting decision. Campbell and his collaborators (2) have observed that these voters, plagued by conflicting attitudes and cross pressures, usually put off their decision until late in the campaign or make no decision at all. This group of voters, ambivalent in its attitudes toward the major candidates, is also likely to experience a great deal of postdecision dissonance and may resort to a variety of techniques to reduce it. According to Festinger (5), a prime method for reducing postdecision dissonance is to increase the perceived attractiveness of the chosen candidate while devaluing the attractiveness of the unchosen alternative. This process of "spreading" the attractiveness of the alternatives functions to bolster or sandbag the decision by adding consonant elements to the chosen object.

The 1968 presidential election is a prime example of a campaign in which there was a large number of conflicted voters. A review of polls taken by professional survey organizations during the 1968 election (3) reveals that one week before the election approximately seven percent of a national sample of voters was undecided. One day before the election four percent of voters was still undecided. The high incidence of late deciders in the 1968 election makes it possible to test our main hypothesis, that time of voting decision is related to postvoting bolstering of the chosen candidate. Specifically, late deciders, in order to reduce residual conflict, will tend to systematically bolster the attractiveness of the chosen candidate after casting their vote; whereas early deciders, free from conflict, will not systematically re-evaluate the attractiveness of the candidates after voting.

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B. METHOD

1. *Subjects*

As part of a course project in Social Relations, 18 Harvard undergraduate and graduate students interviewed a sample of Cambridge, Massachusetts, voters on election day (November 5th, 1968).[2] One hundred forty-three people were interviewed just before they entered the voting station, and 135 were interviewed immediately after they left, yielding a total of 278 successful interviews.[3]

2. *Procedure*

Interviews were conducted at nine voting places located in five different precincts. The interviewer introduced himself and sought the subject's cooperation in a standard manner. "Hello, I'm ———, we are doing a study on how people feel about the presidential candidates (for a course). We would appreciate it if you would agree to answer a few questions. It will take only a minute or two of your time." To begin, the subject was asked whether he intended to vote for one of the three major presidential candidates (Nixon, Humphrey, or Wallace). A response of "No" led to termination of the interview, and 13 respondents were terminated for this reason. Subjects answering "Yes" were given a card containing four closed-ended questions:

(*a*) The first question asked when the voter had decided to vote for his candidate.

(*b*) The second question required the voter to give his opinion about how good a president each of the three candidates would make. His response was marked on a set of seven-point scales running from "extremely poor" through "average" to "extremely good," with a verbal description at each of the seven points.

(*c*) On the third item subjects were required to rate each vice-presidential candidate (Agnew, Muskie, and LeMay) according to how good a vice-president he would make. Again, seven-point scales were used to obtain opinions.

(*d*) Finally, subjects were asked "How certain are you that the presidential candidate you voted for (will vote for) will win?" and were required to check their opinion on a five-point scale running from "not at all certain" to "extremely certain."

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[2] Members of the seminar who acted as interviewers were Ronald Abeles, Sumru Aksoy, Michael Baker, Hans Bleiker, Vicki Flug, Chris Gallagher, Richard Grossman, Joel Kershner, Rozanne Marel, Paul McCarthy, Jean Morehead, Robert Newton, Alvin Ramsey, Gebhard Schweigler, Kay Sternfeld, Parvez Towfighi, Gary Welsh, and Rena Wing.

[3] There were, of course, a large number of people who refused to participate in the study (approximately 32 percent of the 400 persons approached). But to cite a refusal rate is misleading, since almost without exception refusal occurred as the interviewer approached the prospective subject, before the nature and purpose of the survey could be communicated.

Respondents were not asked directly how, in fact, they intended to vote or had voted, but this was inferred from their ratings of the three presidential candidates (question #2). Since the interviews were conducted at the polls, it was felt that a direct question might increase the refusal rate.

C. RESULTS

For purposes of analysis, the sample of 263 people who indicated they were voting for one of the three major candidates was divided approximately at the tetriles according to when they reported having decided on their candidate (*a*) *Early*: June, July, August ($N = 102$), (*b*) *Middle*: September and October ($N = 98$), and (*c*) *Late*: November and "today" ($N = 63$).

1. *Changes in Attractiveness of the Candidates*

It was hypothesized that time of voting decision is related to bolstering of the chosen candidate after balloting. Consequently, we predicted an interaction between *time* of decision (early, middle, or late in the campaign) and *stage* of implementation (before *versus* after casting ballot) in evaluation of the presidential candidates. We expected that among late deciders there would be a systematic difference in ratings of the *most* preferred and *second most* preferred candidates from before to after the act of voting (the chosen candidate would become more attractive, the unchosen would be devalued); among early- and middle-deciders, however, no systematic change in attractiveness after the act of voting was expected.

Table 1 shows the pattern of differences between evaluations of the preferred candidate and his closer rival.

The main matter of interest is the interaction between time of decision and

TABLE 1
DISCREPANCY BETWEEN EVALUATIONS OF THE PREFERRED CANDIDATE AND HIS CLOSER RIVAL BY TIME AND STAGE OF VOTING DECISION

	Stage of decision		
Time of decision	Before voting	After voting	Total
Early	2.31 ($N = 42$)	2.34 ($N = 53$)	2.32 ($N = 95$)
Middle	1.72 ($N = 50$)	1.48 ($N = 44$)	1.61 ($N = 94$)
Late	1.58 ($N = 33$)	1.78 ($N = 27$)	1.67 ($N = 60$)
Total	1.88 ($N = 125$)	1.91 ($N = 124$)	1.90 ($N = 249$)[a]

[a] Fourteen subjects failed to answer this question.

before-after differences in candidate ratings. An analysis of variance carried out to test the interaction effect was not significant. However, as a main effect, time of decision is significant ($F = 9.30$, *df* 2/245, $p < .01$). From the row means in Table 1, it can be seen that the earlier the voter decided during the campaign, the greater the distance in ratings between the top two presidential candidates. Early-deciders with a mean difference score of 2.32 were significantly different from middle-($M = 1.61$) and late-($M = 1.67$) deciders. It is likely that the early-deciders were people who vote straight party, since their choice was allegedly made *before* the August national conventions. These are probably strong partisans who experienced little conflict in accepting their party's nominee, and this is reflected in the large disparity between their ratings of the rival candidates before, as well as after, casting their vote. The late deciders, on the other hand, were faced with something of an avoidance-avoidance conflict, and this is reflected in the low overall rating they gave to each of the candidates. The average ratings for the three presidential candidates were 3.74 (early-deciders), 3.38 (middle-deciders), and 3.27 (late-deciders). Since a rating of 3.00 is "poor," and a rating of 4.00 is "average," it is clear that late-deciders, especially, were confronted with a difficult choice.

2. *Changes in Confidence About a Candidate's Prospects*

Subjects were asked to rate the degree of certainty they felt about their preferred candidate's chances of winning. An increase in optimism from before to after voting can be interpreted, among other things, as an attempt to reduce postvoting dissonance, although it might also reflect a tendency to wishful thinking. The confidence ratings for the chosen candidate are presented in Table 2.

Table 2 shows that voters who have made their decision early in the campaign felt more confident that their candidate would win than did late-de-

TABLE 2
RATINGS OF CONFIDENCE IN PREFERRED CANDIDATE'S VICTORY, BY TIME AND STAGE OF VOTING DECISION

	Stage of decision		
Time of decision	Before voting	After voting	Total
Early	3.07 ($N = 44$)	3.29 ($N = 56$)	3.19 ($N = 100$)
Middle	2.20 ($N = 51$)	2.27 ($N = 45$)	2.23 ($N = 96$)
Late	2.17 ($N = 35$)	2.37 ($N = 27$)	2.26 ($N = 62$)
Total	2.49 ($N = 130$)	2.74 ($N = 128$)	2.61 ($N = 258$)[a]

[a] Five subjects failed to answer this question.

ciders. Analysis of variance for confidence ratings shows that the time of decision main effect was significant at the one percent level ($F = 14.97$, *df* 2/252, $p < .01$). The before-after difference also approaches significance, but only at the ten percent level, with voters expressing greater certainty about their candidate's chances after casting their vote ($M = 2.74$) than before ($M = 2.49$). The interaction between *time* and *stage* of decision was not significant.

D. Discussion

In recent years, there has been a slight, but discernible, shift from the laboratory to the natural environment as the preferred setting for social psychological research. This trend has occurred in the area of decision behavior primarily because it is difficult to introduce important, ego-involving decision dilemmas into the laboratory setting. One of the earliest field studies of decisional dissonance was carried out by Ehrlich and her colleagues (4) in their door-knock survey of new car owners. Walster (9) in her study of postdecisional regret required draftees at a U.S. Army reception center to make important decisions about their future job assignments. More recently, Knox and Inkster (7), in an investigation of postdecision dissonance at the race track, interviewed bettors before and after they placed their bets at the "sellers" window. The present study on voting decisions represents another example of the growing tendency to investigate the strenght of dissonance predictions in uncontrived, real-life settings. The question arises whether an election setting in which voters are compared before and after casting their ballot is suitable for testing dissonance theory propositions about postdecisional behavior. The problem is that most voters have reached a preference decision some time before entering the voting booth, so the act of pulling the lever *per se* does not mark the turning point in the decision process from pre- to postdecisional behavior. This conceptual problem is not unique to the voting situation, but also arises in laboratory studies of decision making (*cf* 8). In addressing himself to this problem, Festinger (6) has now concluded that bolstering or spreading of alternatives, the prime mode of reducing dissonance, occurs only after a person is *committed* to his decision. In the voting situation, the person is not committed to his decision until he actually pulls the lever. Right up to the moment he enters the booth he can change his mind, but once he pulls the lever he has passed the "point of no return." Therefore, the act of voting, in that it signifies the fact of commitment, is a crucial stage in the decision process; immediately after casting his vote, dissonant elements become salient and the decision maker may experience a brief period of regret.

In reviewing the literature on dissonance and decision making, Brehm and Cohen (1) observed that postdecision bolstering or re-evaluation of alternatives occurs in a variety of individual choice situations. The present study reveals that a similar, but weak pattern of re-evaluation occurs in the voting situation even before the outcome of the election is determined. The fact that the decision was essentially a group decision, shared with the remainder of the electorate, might help explain the attenuated bolstering effect. Since bolstering usually takes time and effort, the close proximity of the after-measure to the act of voting might also be responsible for the small effect.

Increased attractiveness of the preferred candidate in the postvoting period is different from the so-called "honeymoon" phase commonly found in the postelection period. Postelection propaganda and a tendency to rally behind the victor underlie the honeymoon phase. The postvoting re-evaluation found in this study can be interpreted more readily within the framework of cognitive dissonance. The rapidity with which such re-evaluation occurs indicates that bolstering of the chosen candidate is probably an automatic, almost mechanical, process. In order for postvoting bolstering to occur, a careful, deliberate reappraisal of the merits and weaknesses of the respective candidates does not appear necessary. Raising the perceived attractiveness of the chosen candidate and inflating his chances of winning are only two of the mechanisms available for bolstering a decision.

E. SUMMARY

A sample of 143 voters in Cambridge, Massachusetts, was interviewed immediately before casting their vote in the 1968 presidential election, and a similar sample of 135 voters was interviewed after leaving the voting station. Voters were classified as early-, middle-, or late-deciders according to when during the campaign they allegedly decided on a candidate. Early-deciders, in comparison with middle- and late-deciders, showed a larger disparity in their ratings of the rival candidates and expressed greater confidence that their preferred candidate would win. The predicted interaction between time of decision and before-after differences in candidate ratings was not obtained. There was a nonsignificant trend for voters, regardless of time of decision, to express greater certainty about their candidate's chances after voting than before. Findings were discussed from the viewpoint of pre- and postdecision conflict dynamics.

REFERENCES

1. BREHM, J. W., & COHEN, A. R. Explorations in Cognitive Dissonance. New York: John Wiley & Sons, 1962.

2. CAMPBELL, A., CONVERSE, P., MILLER, W. E., & STOKES, D. E. The American Voter. New York: John Wiley & Sons, 1960.

3. CROSSLEY, A. M., & CROSSLEY, H. M. Polling in 1968. *Pub. Opin. Quart.*, 1969, **33**, 1-16.

4. EHRLICH, D., GUTTMAN, I., SCHONBACH, P., & MILLS, J. Post decision exposure to relevant information. *J. Abn. & Soc. Psychol.*, 1957, **54**, 98-102.

5. FESTINGER, L. A Theory of Cognitive Dissonance. Evanston, Ill.: Row Peterson, 1957.

6. ———. Conflict, Decision, and Dissonance. Stanford, Calif.: Stanford Univ. Press, 1964.

7. KNOX, R., & INKSTER, J. Post-decision dissonance at post time. *J. Personal. & Soc. Psychol.*, 1968, **8**, 319-323.

8. MANN, L., JANIS, I. L., & CHAPLIN, R. Effects of anticipation of forthcoming information on predecisional processes. *J. Personal & Soc. Psychol.*, 1969, **11**, 10-16.

9. WALSTER, E. The Temporal Sequence of Post-decision Processes. In L. Festinger (Ed.), *Conflict, Decision, and Dissonance.* Stanford, Calif.: Stanford Univ. Press, 1964.

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THE EFFECT OF SEX ROLE PERCEPTION ON TEST TAKING PERFORMANCE*

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A. INTRODUCTION

The ability to visualize space is the architect's need to imagine what a building will look like from a set of blueprints. So many researchers have reported a sex difference in the ability to visualize space that it has become an accepted fact (1, 10). However, there is still disagreement as to the reasons why males average significantly higher than females. Several explanations have been postulated: differential role perception, previous training, and/or hereditary factors.

One of the earliest studies in this area was done by Bennett and Cruikshank (2) who suggested that their observed sex differences were due to different role expectations for males and females. In an analagous study Milton (4, 5, 6) investigated the effect of sex role identification upon problem solving ability. He discovered a positive relationship between degree of masculine role identification and problem solving. In his later studies, he found that by making the problems less appropriate to the masculine sex role, the between sex difference was greatly reduced (although still significant). Sandstrom (8) investigating sex differences between males and females in their visualization and localization, concluded that males had greater success because they approached the task with more assurance, perhaps feeling it was a more appropriate task for them.

In support of the previous training hypothesis, Van Voorhis (15) observed significant changes in space perception after training. Teegarden (13) noticed that the significant differences between males and females on the Minnesota Paper Form Board Tests were nullified when females were allowed a longer time. He concluded that there was probably no actual difference in ability but that males were more familiar with the task and hence could do it in a shorter period of time.

Myers (7) reported significant increases in scores on a test of spatial visu-

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alization after a short course in engineering drawing. Although his sample was restricted to males, it also lends support to the previous training argument.

In a rather extensive study of spatial visualization done with boys and girls in technical schools in England, Smith (9) found that in spite of the training females received there was still an essential difference between them and the males. He concluded that this difference was not due to differential training but was more likely due to differential inheritance.

In support of the hereditary hypothesis, Stafford (11) observed a pattern of family correlations which suggest that the aptitude for spatial visualization is inherited as a sex-linked recessive model. Vandenberg (14) has reported that a number of spatial tests given to twins showed much greater differences between pairs of dizygous twins compared to monozygous twin pairs, a finding which also tends to support the hereditary point of view.

However, since the differential role perception explanation was one of the first and still is the most common explanation for the observed sex differences, it was decided to investigate it further.

B. Method

The hypothesis was made that altering the title and description of a test of spatial visualization to make it appear more appropriate to male or female perceived sex roles would influence the scores of males and females taking the various forms of the test. Therefore, three forms of the test were proposed: a masculine, feminine, and neutrally oriented form. The alternative hypotheses to be tested were that (a) mean score of males would be significantly higher than mean score of females on the masculine and neutral form, (a1) mean score of males on the feminine form would be lower than mean score of females on the same form, (a2) mean score of males on the masculine form would be higher than the mean score of females on the same form; (b) mean score of males on the masculine form would be significantly higher than the mean score of males on the neutral or feminine form; (c) mean score of females on the feminine form would be higher than the mean score on the neutral or masculine form.

The content of the test consisted of 30 items constructed similarly to those from the *Survey of Object Visualization* (3). The stimulus figure in the test represents an unfolded figure, with five possible choices of an assembled figure, one of which is correct. Three different covers were designed: a neutral form entitled "Pattern Development," a masculine form entitled "Drafting Aptitude Test," and a feminine form entitled "Fashion Design Aptitude

Test." Thus the only differences in the three tests were in the title, the description of the test, and the color of the paper. Examples are presented below.

Pattern Development

[Neutral Form on white paper]

Directions: Please do *not* open this test booklet until you are told to do so.

This is a test of your ability to predetermine what shape an unfolded pattern will take when it is assembled.

For example, if Pattern 1 is folded on the dotted lines and the edges of the two side sections brought together, the pattern will look like object B, etc.

Drafting Aptitude Test

[Masculine Form on blue paper]

Directions: Please do *not* open this test booklet until you are told to do so.

This is a test of your ability to see how a two-dimensional mechanical drawing would look as an assembled solid. Because drafting, engineering, architecture, and sheet-metal working all require this type of visualization, it is important to know how a person who might be planning to engage in these activities does on a test of this type.

Your answers to the problems of this test will indicate your ability to predetermine what shape an unfolded pattern will take when assembled.

For example, if Pattern 1 is folded, etc.

Fashion Design Aptitude Test

[Feminine Form on pink paper]

Directions: Please do *not* open this test booklet until you are told to do so.

Successful pattern- and dressmakers, as well as fashion designers, must visualize beautiful clothes from just looking at the pattern pieces from which they are to be created. Therefore, it is important to know how well students contemplating this type of occupation score on a test designed to measure an aptitude for visualization.

Your answers to the problems on this test will indicate your ability to predetermine what shape an unfolded pattern will take when assembled.

For example, if Pattern 1 is folded, etc.

The directions for the masculine form were always read by a male and the directions for the feminine form were always read by a female. The directions for the neutral form were read once by the male and once by the female.

The test was administered to 986 incoming freshmen during orientation week. The assignment of the individuals was done on the basis of alphabetical groupings. Even though no bias should have occurred by this method of assignment it was decided to control also any remaining group differences by utilizing analysis of covariance, since all students had previously been administered another test of spatial visualization—the Identical Blocks Test—described elsewhere (11, 12).

C. RESULTS

The means and standard deviations of the Identical Blocks Test along with the three forms of the spatial visualization test given to the six groups (three male, three female) are shown in Table 1.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF 462 STUDENTS ON THE IDENTICAL BLOCKS TEST AND THE THREE FORMS OF A SPATIAL VISUALIZATION TEST

	Feminine form		Masculine form		Neutral form	
	Ident. Blocks	Fashion design aptit.	Ident. Blocks	Drafting aptitude	Ident. Blocks	Pattern devel.
Males	$\overline{X} = 22.39$ $\sigma = 6.82$	$\overline{Y} = 17.61$ $\sigma = 5.35$	$\overline{X} = 20.83$ $\sigma = 7.24$	$\overline{Y} = 17.60$ $\sigma = 6.28$	$\overline{X} = 21.88$ $\sigma = 5.72$	$\overline{Y} = 16.96$ $\sigma = 5.57$
Females	$\overline{X} = 15.43$ $\sigma = 7.19$	$\overline{Y} = 13.87$ $\sigma = 5.07$	$\overline{X} = 17.45$ $\sigma = 6.90$	$\overline{Y} = 14.65$ $\sigma = 4.99$	$\overline{X} = 16.96$ $\sigma = 7.23$	$\overline{Y} = 15.10$ $\sigma = 4.88$

Critical ratios between any two pair of means of the three different formats of the spatial visualization test for either males or females were all found to have a p greater than .10 and hence were nonsignificant.

The correlation between the Identical Blocks Test and the spatial visualization tests was .54. The only significant component of the covariant analysis was the sex difference and this was true across all conditions and for both tests. The differences in format were not a significant component of the analysis nor was the size of the interaction between sex and format large enough to be significant.

D. DISCUSSION

It may be observed from Table 1 that there were differences between the initial abilities of the groups as indicated by their mean scores on the Identical Blocks Test. It may also be observed that these mean differences were reduced when the spatial visualization test was administered. For example, the mean of the Identical Blocks Test for males taking the feminine form of the spatial visualization test was 1.56 higher than the mean Identical Blocks score of males taking the masculine form of the spatial visualization test, yet the mean difference on the latter test was only .01. Likewise, females taking the masculine and feminine forms of the spatial visualization test resulted in a mean difference of 2.02 on their Identical Blocks Test, yet they were only .78 apart on their spatial visualization means. This suggests a trend in the predicted direction; i.e., the format of the test was slightly affecting scores. However, this trend was apparently not large enough to be significant across the various formats of the spatial visualization test as judged from the results of the analysis of covariance.

If test scores are influenced by the perceived sex role of the examinee in relation to appropriateness of the test, it must be concluded that this was not demonstrated in the present study. Perhaps, the items still appeared too much of a "masculine" type activity, or perhaps the brief description did not really convince the students that they were taking a test meant only for girls or only for boys. It might also be due to the make-up of the sample—entering college freshmen. It was pointed out to the authors[1] that often the most "masculine" boys do not go to college but get a job and likewise the most "feminine" girls get married instead of going to college.

In conclusion, all the null hypotheses were accepted except the first in which it was alternatively hypothesized that the mean of the males would be higher than females on the masculine and neutral form.

E. SUMMARY

Differential role expectation has been proposed as one explanation of the sex difference in spatial visualization. It was hypothesized that alterations in the title and description of a test of spatial visualization, which made it more appealing to predicted male or female interests, would influence their test scores. However, no evidence was found to support the hypothesis.

REFERENCES

1. ANASTASI, A. Differential Psychology (3rd ed.). New York: Macmillan, 1958.
2. BENNETT, G. K., & CRUIKSHANK, R. M. Sex differences in the understanding of mechanical problems. *J. Appl. Psychol.,* 1942, **26**, 121-127.
3. MILLER, D. P. Survey of object visualization. California Test Bureau, Los Angeles, California, 1945.
4. MILTON, G. A. The effects of sex role identification upon problem solving skill. *J. Abn. & Soc. Psychol.,* 1957, **55**, 208-213.
5. ———. Sex differences in problem solving as a function of role appropriateness of problem content. *Psychol. Rep.,* 1959, **5**, 705-708.
6. ———. Five studies of the relation between sex role identification and achievement in problem solving. Technical Report No. 3, Department of Industrial

---

[1] Dr. Ina Uzgiris, personal communication.

Administration, Department of Psychology, Yale University, New Haven, Connecticut, 1958.

7. MYERS, C. T. A note on spatial visualization, pretest and posttest. *Educ. & Psychol. Meas.*, 1953, **13**, 596-600.
8. SANDSTROM, C. I. Sex differences in localization and orientation. *Acta Psychologica,* 1953, **9**, 82-96.
9. SMITH, I. M. Measurement of spatial ability in school pupils. *Occup. Psychol.*, 1948, **22**, 150-159.
10. ———. Spatial Ability, its Educational and Social Significance. San Diego, Calif.: Robert Knapp, 1964.
11. STAFFORD, R. E. Sex differences in spatial visualization as evidence of sex-linked inheritance. *Percept. & Motor Skills,* 1961, **13**, 428.
12. ———. An investigation of similarities in parent-child test scores for evidence of hereditary components. Research Bulletin RB 63-11, Educational Testing Service, Princeton, New Jersey, 1963.
13. TEEGARDEN, L. Manipulative performance of young adult applicants at a public employment office, Part II. *J. Appl. Psychol.*, 1942, **26**, 754-769.
14. VANDENBERG, S. G. A twin study of spatial ability. Research Report No. 26, Child Development Unit, University of Louisville School of Medicine, Louisville, Kentucky, 1967.
15. VAN VOORHIS, W. R. The improvement of space perception ability by training. Unpublished Doctor's dissertation, The Pennsylvania State University, University Park, 1941.

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SHAPING COOPERATIVE BEHAVIOR IN YOUNG CHILDREN*[1]

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A. Introduction

Cooperative play between children in the natural environment has been reported to begin between ages 3 and 6 (3, 4, 5). Several studies have demonstrated that a contrived cooperative behavior between children—i.e., one with behavioral components not typically observed in the repertoires of children in the natural environment—can be brought under reinforcement control (1, 2, 6, 8). However, such studies have seldom used 4- to 6-year-old children and no study has shown that a difficult cooperative behavior can be shaped in children of this age.

B. Method

1. *Definition of the Cooperative Response*

The cooperative response in the present study was nearly synchronous placement of wooden styli into opposite holes in a table. The latency defining synchrony was three seconds or less; .5 seconds was the lower limit in this study. Timing of the latency period began when either *S* inserted his stylus into any hole. A cooperative response was recorded when both *S*s inserted their styli into any one pair of three available pairs of opposite holes in the table within the latency period. Both styli had to be in their respective holes together for at least a fraction of the latency period; i.e., duration of the response was any length of time greater than zero.

2. *Subjects*

Ten pairs of preschool children between 4½ and 5½ years of age served as *S*s.[2] There was less than eight months difference in age between *S*s in any pair. At least some degree of acquaintance existed between *S*s in each pair.

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[2] We are grateful to Mrs. Marie Lerner, Mrs. Charlotte Henzie, and Mrs. Lucille Meadows, and the parents of the Claremont United Church of Christ Congregational Nursery School for their enthusiastic cooperation and assistance.

3. *Apparatus*

The apparatus was modeled after the one described by Azrin and Lindsley (1). A small table with a chair on each end was placed in the center of an otherwise empty room, separated from adjacent control and observation rooms by one-way mirrors. On each side of the table were three holes and a wooden stylus attached to the table by a small chain. The holes were tapered from 1¼ inches to ¼ inch to facilitate the insertion of the styli. Transparent plastic was mounted down the middle and along the sides of the table. A Ralph Gerbrands automatic M&M dispenser and a single-tone door chime were housed in a wooden box on one side of the table. The chime sounded once as the M&M dispenser delivered two M&Ms onto the table for each cooperative response. The electrical wiring from the table was formed into a cable leading into the control room, which contained the rest of the experimental apparatus. Sound recording was possible by means of an intercommunication system. A Rustrak 8-channel event recorder, moving at eight inches per minute was used to record various data. Channel 1 was used to mark the end of handshaping with the initiation of machine-controlled reinforcement, and any special problems. Channel 2 recorded changes in the latency criterion. Channel 3 was used to record time of verbalizations about the reinforcement contingency. Channel 4 recorded all responses (cooperative and noncooperative) of one *S*, while Channel 5 recorded all of those of the other *S*. Channel 6 recorded when styli were placed in opposite holes (no latency requirement). Channel 7 recorded responses in opposite holes within the latency requirement, which was decreased from 3.0 seconds to .5 seconds after handshaping was terminated. Channel 8 recorded all reinforcements delivered. Markings on Channels 7 and 8 did not necessarily coincide because of the changing criteria of the handshaping procedure and the fact that cooperative responses could be emitted more rapidly than the M&M dispenser would operate, which was two M&Ms every 1.2 seconds. The maximum number of reinforcements given consecutively in any one pair of opposite holes was set at seven.

4. *Procedure*

All pairs of *S*s were run over a weekend in order to avoid returning pairs to the nursery school where they would have an opportunity to discuss their experience with other *S*s. One *E* picked up the *S*s at their homes and brought them to a waiting room near the laboratory. From the waiting room they were taken into the experimental room. After the session, they were returned home and the next pair of *S*s was brought in.

Prior to the study, *E*s had played with the children at the nursery school so that on the day of the experiment the children would accompany them willingly. Before taking *S*s to the experimental room, *E* asked them about what they would be doing, which usually resulted in comments indicating no knowledge at all about the forthcoming event, and occasionally a comment about "going to play." Only totally naive *S*s were used in the study.

When *S*s were brought into the experimental room, they were told, "While you are here, you may get some M&Ms. If you do, you can put them in these cups (handing them paper cups) or you can eat them. I have to go now. I will be back after a while." The reason for these comments was that in pilot work it was found that some children were not sure if they could have the M&Ms. *E* then joined the other *E* in the control room.

During each session, one *E* operated the event marking buttons for the first three tracks of the recorder, recorded verbalizations of the reinforcement contingency (e.g., "Let's do it in this hole," "We have to do it at the same time," etc.), and also recorded other noteworthy behavior, especially "superstitious" behavior. The other *E* concentrated totally on shaping the children's behavior. The first goal of the shaping procedure was to get both *S*s to place their styli in the holes. This was accomplished by successively reinforcing *S*s for approaching the table, sitting at the table, touching the styli, inserting the styli in the holes, and finally, for both *S*s placing their styli in holes. The next goal was to shape responding in opposite holes with little regard for latency. This was accomplished by either of two methods. By one method, *S*s were reinforced whenever they placed their styli in *any* pair of opposite holes, with a maximum of 10 consecutive reinforcements in any one pair of opposite holes. By the other method, *S*s were reinforced only when one or both responded in a particular pair of opposite holes. After *S*s were responding consistently in this particular pair of opposite holes (disregarding latency), *E* made reinforcement contingent upon responding in another pair of opposite holes, etc.

With either of the two methods, when *S*s were consistently responding opposite each other in any pair of holes, *E* began to shape in the latency requirement of the cooperative response by reinforcing only the more nearly synchronous responses. When *S*s were regularly responding in opposite holes within a three-second latency period, and were shifting to other pairs of opposite holes, shaping was discontinued and machine reinforcement initiated. With the maximum number of reinforcements on any given pair of opposite holes set at seven, the three-second latency period was shortened by steps until a latency of .5 seconds was reached. The session was terminated when a high stable rate of cooperative responding at .5-second latency was achieved. For *S*s who did not reach the .5-second lower latency limit, sessions were terminated after 30 minutes or more and after *S*s had emitted no cooperative responses for at least five minutes.

At the end of a session, *E* entered the observation room and asked, "What did you have to do to get an M&M?" The other *E* recorded verbalizations and demonstrations.

C. RESULTS

Five of 10 pairs of children could not be shaped to cooperate. Of these five pairs, two failed to emit any responses (cooperative or noncooperative) in sessions of 32 and 36 minutes, and one gave only 10 responses (noncooperative) in 30 minutes. The other two pairs emitted an average of .5 and 3.2 cooperative responses per minute with no latency requirement in sessions of 32 and 44 minutes, but these rates were highly variable so that a latency requirement could not be introduced.

The other five pairs of children were successfully shaped to cooperate. Two of these five pairs developed cooperative behavior characterized by a latency of three seconds and a maximum of seven successive reinforcements per pair of opposite holes in sessions of 32.5 and 55.5 minutes. The other three pairs were successfully shaped to high, stable cooperative rates at the .5-second latency limit in sessions of 20, 22, and 22.5 minutes. Representative of these three pairs are the data for the pair presented in Figure 1. It can be seen that no cooperative responses were emitted for the first eight minutes of the session, and that acquisition of cooperation, as defined by insertion of styli in opposite holes but without a latency requirement, occurred between minutes eight and 10. After minute 10, the rate of cooperation showed a marked increase and remained fairly stable for the rest of the session despite the introduction of more and more stringent latency requirements.

It is important to demonstrate for the five successfully shaped pairs that selective reinforcement control over cooperative behavior was obtained, and not simply control over generalized responding (7). The ratio of twice the number of cooperative responses (since each cooperative response takes two individual responses) to the number of individual (total) responses (the C/I ratio) for the first 50 individual responses was compared with the C/I ratio for the first 50 responses after machine controlled reinforcement with a three-second latency was introduced. The means of these ratios were .216 and .520, respectively, and a *t* test showed them to be significantly different ($t = 3.77$, $df = 4$, $p < .01$), thus showing selective reinforcement control over cooperation.

Occasional verbalizations of "superstitious" contingencies for reinforcements were recorded, such as suggestions that touching the table, shaking the table, switching chairs, opening the door, or running around the table twice before responding would produce M&Ms.

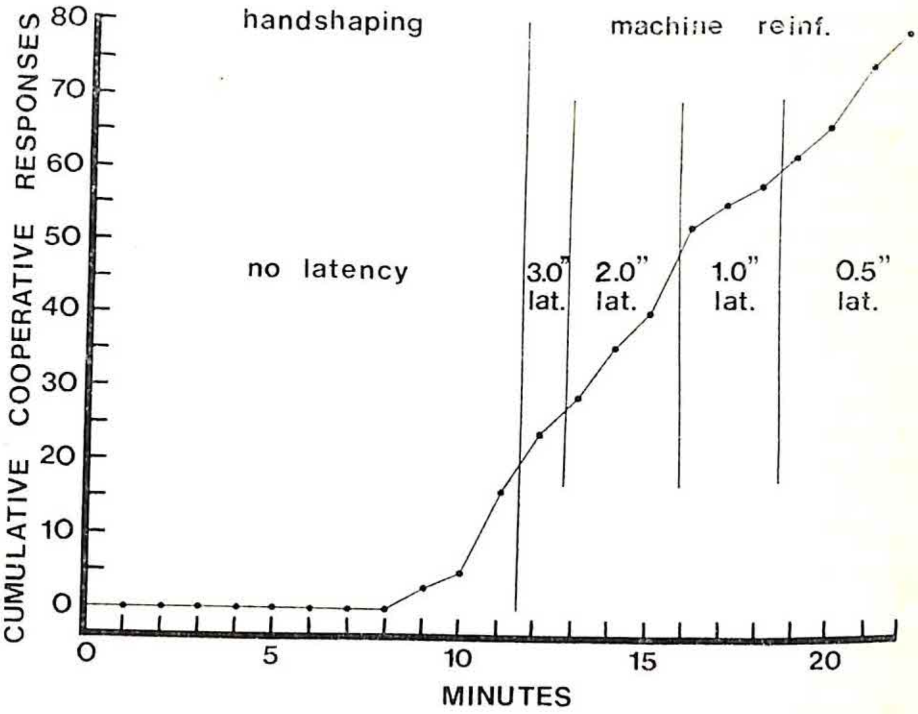

FIGURE 1
Cumulative Cooperative Response Rate Curve for a Pair of *S*s

In response to the postsession question, no pair of *S*s verbalized an explanation of the response-reinforcement contingency. However, all three pairs who reached the .5-second latency, and one of the two pairs with the three-second latency correctly demonstrated the contingency, whereas no other pairs were able to do so.

D. Discussion

Since three of 10 pairs were shaped to a high rate of difficult cooperative behavior in less than half an hour, it may be concluded that the method of successive approximations can be used to develop quickly and effectively such behavior in some 4- and 5-year-old children. The cooperative behavior that was developed includes many components which are not present, or present at only a low rate, in the preschooler's behavioral repertoire: e.g., sitting at a table for many minutes, manipulating a pencil-like stylus in a coordinated, timed manner, watching one another in order to coordinate action precisely, etc. The kind of behavior that was developed is, in this respect, unlike the cooperative play reported by naturalistic observation.

The experimental situation and procedure were somewhat analogous to the behavior shaping of lower organisms in a Skinner box. *E*'s comments at the beginning of the session may have served the function that an adaptation period does for a naive rat in a Skinner box. The "superstitious" behavior observed in lower organisms has its analogue in certain behaviors observed in the present study, except that the children frequently verbalized a contingency between their "superstitious" behavior and the reinforcement. These "superstitions" may be attributable in part to the delivery of the reinforcement when only one *S* was emitting the desired behavior, but leaving the other *S* to conclude that some aspect of his own behavior resulted in the reinforcement. In general, the reinforcing power of M&Ms for children is probably less than the reinforcing power of food pellets for a 24-hour-deprived rat. For some pairs, social play competed with the M&Ms as a reinforcing event, and the mirrors surrounding the observation room proved particularly distracting to several *S*s. The three pairs who were shaped to the .5-second latency limit were not distracted by the mirrors or by social play.

REFERENCES

1. AZRIN, N. H., & LINDSLEY, O. R. The reinforcement of cooperation between children. *J. Abn. & Soc. Psychol.*, 1956, **52**, 100-102.
2. COHEN, D. J. Justin and his peers: An experimental analysis of a child's social world. *Child Devel.*, 1962, **33**, 697-717.
3. HURLOCK, E. B. Developmental Psychology. New York: McGraw-Hill, 1968.
4. PARTEN, M. B. Social participation among preschool children. *J. Abn. & Soc. Psychol.*, 1933, **27**, 243-269.
5. STONE, L. J., & CHURCH, J. Childhood and Adolescence: A Psychology of the Growing Person. New York: Random House, 1968.
6. VOGLER, R. E. Awareness and the operant conditioning of a cooperative response. *J. of Psychol.*, 1968, **69**, 117-127.
7. ———. Possibility of artifact in studies of cooperation. *Psychol. Rep.*, 1968, **23**, 9-10.
8. WEINGOLD, H. P., & WEBSTER, R. L. Effects of punishment on a cooperative behavior in children. *Child Devel.*, 1964, **35**, 1211-1216.

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YOUNG AMERICANS' REPORTED PERCEPTIONS OF THEIR PARENTS*

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A. INTRODUCTION

In 1965 Breznitz and Kugelmass designed an 8-item questionnaire aimed at tapping adolescents' perceptions of their parents (1). The questionnaire includes four items *assumed* to measure expressivity (E) and four items *assumed* to measure instrumentality (I) as defined by Parsons and Bales (3). The items were designed to encourage consideration of the parents in relation to the family as a whole or in relation to the respondent specifically.

It was predicted that both males and females would name the Mother for E, and the Father for I items when parents were viewed in relation to the family. But, it was also predicted that the like-sex parent would be named for I items and the cross-sex parent would be named for E items when the point of reference was the respondent himself.

Predictions regarding which parent would be most often named for specific items were tested when students in a city high school in Israel (1) and Kibbutz children attending eighth grade (2) were respondents. But, at no time was an attempt made to determine whether the parent named for an item would be called I or E by the respondent.

The present study was designed to test further the Breznitz and Kugelmass predictions regarding which parent would be named for each item and to determine whether respondents would call Father I and Mother E regardless of whether the family or the self was the frame of reference.

B. METHOD

1. *Subjects*

Subjects were high school students (HS), students attending a small liberal arts college (C) and students attending a medium-sized university (U).

The HS group included all students attending school on the test day who

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agreed to cooperate in the task and who were currently living at home with both parents. Forty-three males and 44 females met the criteria.

The C group included 53 males and 98 females recruited from basic psychology and sociology courses who met the criteria: (*a*) present on test day and agreeing to cooperate on the task, (*b*) now living at home with both parents present or having lived in such a home until enrollment at the college, and (*c*) now 17 to 22 years of age.

The U group included 72 males and 75 females, recruited from basic psychology courses, who met the criteria outlined for C group.

The college from which respondents were selected is a state-supported liberal arts college located in a small Mid-West city. This city is relatively isolated from any large urban area and is inhabited mainly by first and second generation Scandinavian-Americans. The school draws its students primarily from this city and the surrounding area.

The high school is located on the campus with the college and is affiliated with it. It draws its students from the same population as the college.

The university from which respondents were selected is privately supported. It is located in a large western city and draws its students both from the local area and from several large metropolitan areas of the United States.

2. *Materials*

Materials were pencils and the 8-item questionnaire shown below. All items except #1 were those used by Breznitz and Kugelmass (1) and by Kugelmass and Breznitz (2). Item #1 was substituted for one of the original items because a pilot study indicated that the meaning of this item was unclear to university respondents. The designation in parentheses following each item is the family-self frame of reference and the Instrumentality-Expressivity classification given the item by Breznitz and Kugelmass (1). This designation did not appear on the questionnaire given to respondents.

1. If you and one parent were going to work on a project, and you wanted a step by step outline of the procedure to be followed, with which parent would you choose to work?__________(S-I) Mother
Father

2. Which of your parents knows more?__________(F-I) Mother
Father

3. Which is more considerate of other people's feelings?__________
(F-E) Mother Father

4. Which demands more of you?__________(S-I) Mother
Father

5. Which generally takes your side in arguments?__________(S-E) Mother Father

6. Which makes decisions at home?__________(S-E) Mother Father

7. Which is nicer to you?__________(S-E) Mother Father

8. Which is the kinder?__________(F-E) Mother Father

3. *Procedure*

Respondents were met in groups in their classrooms and given the questionnaire after being told that all work must be independent, that there were no right and wrong answers and that how the questionnaire was answered would influence their grades in no way. They were instructed to indicate sex, age, grade in school, and whether they now lived or had lived at home with both parents present. No names were put on the questionnaires. They were told to read each item carefully and to circle *either* Mother or Father in response to each item. Finally, they were instructed to reread each item and to indicate whether the parent circled for that item best fit the definition of Instrumentality or Expressivity shown to them. The definitions were the Parson and Bales' definitions restated in more simple language.

C. RESULTS

The data were analyzed by chi square tests in which the observed frequencies of Mother-Father responses were compared with frequencies to be expected on the basis of a 50-50 Mother-Father split. Identical chi squares were computed when I-E responses were the focus of attention. In the latter case a binomial test was used when frequencies were too small to allow use of chi square. Table 1 shows the two more common Mother-Father responses given to each item and the level of significance reached by the chi squares.

As Table 1 indicates, regardless of the sample group considered, male respondents tended to answer Father to *assumed* I items and Mother to *assumed* E items. As predicted, this tendency occurred regardless of whether items encouraged use of the family or the self as the frame of reference. In all but six of the 24 comparisons these differences were significant at the .05 level or higher. The six exceptions involved items which encouraged use of the self as the frame of reference.

Female respondents tended to name Mother for *assumed* E items and Father for *assumed* I items when the family was encouraged as the frame of reference. In all but one of these comparisons, chi squares reached at least the .05 level of significance. When the self was encouraged as the frame of reference, HS and C females tended to name Mother regardless of whether the item was *assumed* to be I or E. In contrast, U females tended to name Father for *assumed* I items and Mother for *assumed* E items. With four exceptions, these trends were significant at the .05 level or higher.

TABLE 1
MORE FREQUENT MOTHER-FATHER RESPONSES AND SIGNIFICANCE LEVELS OF THE CHI SQUARES[a]

Item	Males			Females		
	HS	C	U	HS	C	U
#2 (F-I)	F .005	F .005	F .005	F .005	F .005	F .005
#6 (F-I)	F .005	F .005	F .005	F .025	F .005	F .005
#3 (F-E)	M .005	M .005	M .005	M .025	M .025	M .005
#8 (F-E)	M .010	M .005	M .005	M .025	M ns	M .005
#1 (S-I)	F .050	F .005	F .005	M .005	M .050	F .005
#4 (S-I)	F ns	F .050	F .005	M ns	M ns	F ns
#5 (S-E)	M ns	M ns	M ns	M ns	M .025	M .005
#7 (S-E)	M ns	M ns	M .005	M .025	M .050	M .005

[a] ns = below the .05 level of significance.

Perusal of Tables 1 and 2 together suggests two conclusions. First, respondents who named the most frequently named parent for an item usually called that parent either I or E consistently. In general, Mother was more frequently called E and Father was more frequently called I regardless of the self-family or I-E classification given the item by Breznitz and Kugelmass. The two times respondents did not designate the more frequently named parent as I or E consistently occurred when HS and C females showed only a nonsignificant trend toward naming Mother more often than Father on item #4.

Second, respondents who named the less frequently named parent for an item failed to label the parent named I or E consistently in 35 of 48 comparisons. In the 13 comparisons where the less frequently named parent was clearly designated either I or E, Mother was called E five times (two family and three self items). Father was called I six times (two family and four self items), and Father was called E twice (one family and one self item). Six of these designations were made by females and seven were made by males. Both of the Father E designations were made by females.

D. DISCUSSION

The data presented are in agreement with the conclusions drawn from the family items in the Breznitz and Kugelmass (1) and the Kugelmass and

TABLE 2
MORE FREQUENT I-E RESPONSES, SIGNIFICANCE LEVELS OF I-E CHI SQUARES[a] AND *N*s[b]

Item	Males HS	C	U	Females HS	C	U
			Mother responses			
#2 (F-I)	E .050(11)	= ns(16)	E ns(12)	E ns(9)	E ns(29)	E .010(17)
#6 (F-I)	I ns(3)	I ns(9)	= ns(12)	E ns(12)	I ns(15)	I ns(16)
#3 (F-E)	E .005(31)	E .005(44)	E .005(49)	E .005(28)	E .005(57)	E .005(49)
#8 (F-E)	E .005(27)	E .005(42)	E .005(52)	E .005(26)	E .005(51)	E .005(50)
#1 (S-I)	E .005(15)	E ns(14)	E .025(15)	E .005(31)	E .005(57)	E ns(24)
#4 (S-I)	E ns(15)	E ns(19)	E .005(23)	E ns(26)	E ns(53)	I ns(29)
#5 (S-E)	E .005(25)	E .005(30)	E .005(42)	E .005(21)	E .005(57)	E .005(53)
#7 (S-E)	E .005(23)	E .005(30)	E .005(50)	E .005(26)	E .005(54)	E .005(49)
			Father responses			
#2 (F-I)	I .005(30)	I .005(37)	I .005(57)	I .005(32)	I .005(63)	I .005(55)
#6 (F-I)	I .005(36)	I .005(43)	I .005(58)	I .005(28)	I .005(78)	I .005(56)
#3 (F-E)	I ns(10)	I ns(8)	I .050(21)	E ns(13)	= ns(34)	E ns(23)
#8 (F-E)	I .050(11)	E ns(9)	= ns(14)	E ns(12)	= ns(38)	E .025(21)
#1 (S-I)	I .005(28)	I .005(39)	I .005(56)	I ns(10)	I .010(38)	I .005(50)
#4 (S-I)	I .005(27)	I .005(34)	I .005(47)	I .005(17)	I .005(40)	I .005(43)
#5 (S-E)	I .010(14)	E ns(23)	I ns(26)	E ns(18)	I ns(33)	= ns(18)
#7 (S-E)	I ns(16)	I ns(21)	I ns(16)	E ns(12)	I ns(35)	E .005(22)

[a] ns = below the .05 level of significance.

[b] Because some *S*s failed to answer all items according to instructions, some tests are based on *N*s smaller than those mentioned in the text.

Breznitz (2) data. Both males and females more often named Father for items #2 and #6 and Mother for items #3 and #8. That this response tendency has some generality among young Americans is attested to by the fact that the frequencies of Mother and Father responses were significantly different from chance in 23 of the 24 comparisons made.

The notion that the like-sex parent would be named for items #1 and #4 was supported by the data from all three male samples and by the data yielded by HS and C females. The U females deviated from other female respondents in their responses to these items.

The notion that the cross-sex parent would be the more frequent response to items #5 and #7 appears not to be supported by the data since both sexes tended to name Mother more often than Father for both items. The finding that only one of the six trends in the expected direction for males was significant while five of the six trends in the unexpected direction for females were significant also mitigates against the notion that the cross-sex parent was the more frequent response for these items.

The data also indicate that when respondents named the more frequently named parent for an item, they were consistent in labeling that parent as either I or E. Regardless of whether self or family was the frame of reference, when Mother was the more frequent response, Mother was more frequently called E. When Father was the more frequent response, Father was more frequently called I.

The most common finding regarding the I-E designations made by respondents naming the less frequently named parent for an item was that they were inconsistent in calling the parent named either I or E. This failure to make consistent I-E designations occurred in 35 of the 48 comparisons involving respondents who named the less frequently named parent for an item. This group of deviant responders were also the only ones who gave evidence supporting the idea that Father might be perceived as E. The U females who named Father on items #8 and #7 were consistent in calling Father E more often than I (item #8, $p < .025$; item #7, $p < .005$).

That some items failed to yield significant differences in the frequency of Mother-Father responses and in the I-E designation of the parent named makes it tempting to conclude that there is confusion regarding parental roles. However, before such a conclusion can be reached alternative explanations must be considered. First, failure to make a clear Mother-Father or I-E differentiation could occur because the respondent perceives the behavior specified in the item as belonging to one parental role at the same time as he perceives deviation from the accepted role differentiation in his own family. Some respondents might be willing to admit role deviation as others are not. As a result, failure to make a clear Mother-Father differentiation would occur for that item. Also, even if a respondent perceives role deviation and names the less frequently named parent for the item, he may be unwilling to go one step further and actually assign the inappropriate parental role to the parent named. In sum, failure to find clear discrimination for an item may not reflect confusion but unwillingness on the part of the respondent to report perceived deviancy in his own family.

Second, failure to find clear differentiation in Mother-Father responses or in I-E responses may simply be reflecting the fact that the items are not clearly Mother-Father or I-E items. Respondents may have a relatively clear perception of their parents' behavior and may consider the perceived behavior to be nondeviant. But they may also perceive the behavior of one parent as "fitting" the behavior described about as well as the behavior of the other parent. In sum, it seems that future research might benefit from the rewriting or qualification of the items used.

Although the data reported here fail to explain why all items did not elicit consensus as to Mother-Father and I-E differentiations, they do suggest some conclusions. First, regardless of the sample or the sex of the respondent, the responses made were very similar. Apparently there is some generality to these reported perceptions. Second, when clear I-E differentiations were reported Mother was more often called E and Father, I, regardless of the frame of reference. Third, the I-E designation assigned to the items by their designer did not necessarily correspond to the I-E differentiation reported by the respondents.

E. SUMMARY

Samples of American high school students, college students, and university students were given a modified form of the Breznitz and Kugelmass questionnaire designed to study adolescents' perceptions of their parents. The students were asked to answer *either* Mother *or* Father to each of eight items and to indicate whether the parent named was perceived as instrumental (I) or expressive (E). All items were forced choice.

The data suggested: (*a*) Regardless of the sample or sex of the respondents the responses given were very similar. (*b*) When clear I-E differentiations were reported Mother was more often called E and Father, I, regardless of the frame of reference encouraged by the item. (*c*) The I-E designation

assigned to the items by their designer did not necessarily correspond to the I-E assignment made by respondents.

REFERENCES

1. BREZNITZ, S., & KUGELMASS, S. The perception of parents by adolescents: consideration of the instrumentality-expressivity differentiation. *Hum. Relat.*, 1965, **18**, 103-113.
2. KUGELMASS, S., & BREZNITZ, S. Perception of parents by Kibbutz adolescents: A further test of the instrumentality-expressivity model. *Hum. Relat.*, 1966, **19**, 117-121.
3. PARSONS, T., & BALES, R. F. Family, Socialization, and Interaction Process. Glencoe, Ill.: The Free Press, 1955.

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COMPARISON BETWEEN AMERICANS LIVING IN ISRAEL AND THOSE WHO RETURNED TO AMERICA: PART I, AMERICAN BACKGROUND* [1]

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GERALD ENGEL

A. INTRODUCTION

Comparisons were made between American permanent residents of Israel according to their acceptance or rejection of Judaism as a religion, concerning their American and Israeli backgrounds, and their predictions about America and Israel (2, 3, 4). These permanent residents of Israel are now compared with native Americans who lived in Israel and returned to America. Part I focuses upon subjects' American background.

Permanent residents of Israel, no matter what their original intentions about remaining in the Jewish homeland, chose Israel as their permanent home during the years 1962 through 1966. Returnees include some individuals who came to reside in Israel temporarily, the undecided, and those who had planned to settle permanently in the Jewish State. The basis for comparing Americans in Israel with those who returned to their native lands, was their common need to leave Canada and the United States to reside in Israel.

Part I focuses upon the alienation of natives from American society (6, 10, 11, 15) and the intensity of their drive to achieve greater Jewish identification (9) by moving to Israel. This comparison between permanent residents and returnees provides an opportunity to note similarities and differences related to physical rootedness in America, identification with the American Jewish community, secular and Jewish education.

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Differences in background illustrate why some settlers continue to reside in Israel, while others return to America. All shared a mutual attraction to Israel, but some who came stayed, while others returned to America. Action causes attitudinal changes to reduce dissonance (1, 7, 12). Intensity of identification with America causes a difference in response to the experience of living in Israel (5, 13, 14).

B. METHOD

1. *Subjects*

From the registry of permanent residents of Israel were selected 780 Americans born in either the United States or Canada who became permanent residents of Israel during the years 1962 through 1966, and were 20 years of age or older by the end of 1966. Seventy-seven names were eliminated including six who said they left America as infants, six deceased, and 65 not in Israel from March through August 1967 when the questionnaire was administered. Of 703 potential subjects 443 cooperated, a 63 percent response.

The list of returnees came from three major sources. Those who completed the questionnaire in Israel provided names and addresses of Americans who had lived in Israel and returned to America. Names of potential subjects were culled from the inactive membership file of the Association of Americans and Canadians in Israel. Those who answered the questionnaire in America also provided names and addresses of returnees. A total of 256 native-born Americans who had both lived in Israel at least one year and were 20 years of age or older when responding in America in 1968 are the returnees in this study.

Of permanent residents living in Israel, 45.1 percent are males; 54.9 percent, females. Of the returnees, 50 percent are males; 50 percent, females. Of the returnees, 14.8 percent were born in Canada as compared to 9.5 percent of the permanent residents (chi square .05). This difference in place of birth may suggest a sampling bias among returnees.

Permanent residents of Israel arrived from America from 1950 through 1966: 32 percent came from 1950 through 1961, while 68 percent came from 1962 through 1966. By comparison 1.1 percent of the returnees came before 1947; 10.6 percent, during the years 1947 through 1949. From 1950 through 1961, 42.3 percent arrived in Israel. During the years 1962 through 1967, 46 percent came. The American society which both groups experienced was similar.

Returnees differ from permanent residents with regard to years lived in

Israel. Of the returnees 78.9 percent lived in Israel under five years; 16.4 percent, between five and nine years; 4.7 percent, 10 or more years. By contrast among permanent residents 43.6 percent have lived in Israel under five years; 42.2 percent, between five and nine years; 14.2 percent, 10 or more years (chi square .001). Despite differences in number of years lived in Israel, returnees resided in Israel during the years that permanent residents were in Israel, indicating an overlapping time exposure to life in the Jewish homeland.

2. *Questionnaire*

The four-page self-administering questionnaire used in Israel and in America was identical for the first three pages. The fourth page made allowance for the difference in place of residence.

Subjects in both locales were approached similarly. The questionnaire was mailed along with an explanatory letter and a stamped, self-addressed return envelope. In Israel, subjects were solicited by mail four times; in America, twice.

3. *Inquiry*

Questions raised consider the possibility of a consistent and distinctive life style differentiating Americans settling permanently in Israel from those who return to America. Are returnees more acclimated to American life?

Question 1. Are returnees to America more educated secularly but less educated Jewishly than permanent residents of Israel?

Question 2. Are returnees identified more with American Jewish life than permanent residents?

Question 3. Do returnees include fewer who classified themselves as orthodox in America than permanent residents?

Question 4. Are returnees less disturbed by aspects of American life than permanent residents?

Question 5. Do returnees come to live in Israel after more trips and more years from their initial trip than those who settled in Israel?

C. RESULTS

Results presented are based upon chi square (χ^2) tests of goodness of fit. All probabilities (p-values) quoted are at levels of significance associated with these tests.

Question 1 is affirmed. More returnees had been educated beyond college than permanent residents, while fewer returnees had experienced intensive Jewish parochial school education. Less intensive Jewish elementary education among returnees is reflected in fewer returnees having good command of conversational Hebrew upon arrival in Israel (see Table 1). Yet, both groups were exposed to elementary Jewish schooling: 93.4 percent of the returnees compared to 90.5 percent of permanent residents.

Question 2 is affirmed. More returnees had affiliated with Hillel, a Jewish collegiate organization. No significant difference was observed regarding participation in synagogue, Zionist youth, and Zionist adult organizations (see

TABLE 1
SECULAR AND JEWISH SCHOOLING

Question	Percentages: Returnees in America (N-256)	Percentages: Permanent residents in Israel (N-443)
School years completed:	(N-255)***	(N-442)
0-12 (high school)	10.6	21.7
13-16 (college)	35.7	45.5
17-20 (postgraduate)	53.7	32.8
Technical school:	(N-226)	(N-402)
no	93.4	89.6
yes	6.6	10.4
Sunday school:	(N-169)***	(N-378)
no	43.8	68.3
yes	56.2	31.7
After public school learning:	(N-195)***	(N-379)
no	31.8	52.8
yes	68.2	47.2
Day school (parochial school):	(N-165)	(N-380)*
no	73.3	63.2
yes	26.7	36.8
Jewish graduate studies:	(N-224)**	(N-422)
no	84.4	91.2
yes	15.6	8.8
Hebrew teachers seminary:	(N-222)	(N-407)
no	85.1	82.1
yes	14.9	17.9
Rabbinical seminary:	(N-234)	(N-423)
no	93.2	90.5
yes	6.8	9.5
Ability in conversational Hebrew on arrival in Israel:	(N-253)	(N-438)*
none	36.0	35.2
some	35.6	27.2
much	28.5	37.7

Note: All tables derived from BMD02s—Contingency Table Analysis—Version of April 21, 1965, Health Sciences Computing Facility, UCLA.

* Chi square significant difference = .025.
** Chi square significant difference = .01.
*** Chi square significant difference = .001.

Table 2). Zionist home background was also similar for both groups: 50.8 percent of returnees compared to 55.6 percent of permanent residents came from Zionist homes, while 46.5 percent of returnees compared to 41.7 percent of settlers came from neutral homes. Among both groups 2.8 percent grew up in anti-Zionist homes.

TABLE 2
JEWISH ORGANIZATION PARTICIPATION AND RELIGIOUS IDENTIFICATION

	Percentages	
Question	Returnees in America (*N*-256)	Permanent residents in Israel (*N*-443)
Participated in Jewish organizations:		
Zionist youth	(*N*-225)	(*N*-378)
no	36.9	42.9
yes	63.1	57.1
Zionist adult	(*N*-170)	(*N*-316)
no	71.2	68.0
yes	28.8	32.0
Synagogue	(*N*-176)	(*N*-320)
no	57.4	56.3
yes	42.6	43.8
Hillel	(*N*-189)*	(*N*-326)
no	52.4	75.8
yes	47.6	24.2
Others	(*N*-117)	(*N*-216)
no	73.5	77.8
yes	26.5	22.2
Consider self in America:	(*N*-254)	(*N*-439)*
Orthodox	16.9	34.4
Conservative	36.6	24.4
Reform	6.7	7.5
Culturally Jewish	32.3	23.0
Other	7.5	10.7

* Chi square significant difference = .001.

Returnees were more rooted in the American community: 38 percent are children of native-born American fathers compared to 27.4 percent for permanent residents (chi square .02). Similarly, more returnees had native American mothers: 49.2 percent in contrast to 36.1 percent for permanent residents (chi square .005).

Question 3 is affirmed. Half as many returnees considered themselves orthodox in America as did permanent residents (see Table 2).

This significant difference is also observable in their parental homes: 28.5 percent of returnees compared to 41.2 percent of permanent residents came from orthodox homes. By contrast, more returnees—37.2 percent—came from conservative homes than did permanent residents—25.3 percent (chi square .005). Little difference is noted in reform home background: 7.1 percent of the returnees as compared to 6.9 percent of permanent residents. There is also little difference among those from culturally Jewish home background: 17.4 percent of returnees and 18.9 percent of settlers. Those coming from

TABLE 3
DISTURBING FACTORS ABOUT AMERICAN LIFE

	Percentages	
Question	Returnees in America (*N*-256)	Permanent residents in Israel (*N*-443)
Materialism	(*N*-254)	(*N*-369)
none	28.6	27.9
some	33.8	35.2
much	37.6	36.9
Conformity	(*N*-230)	(*N*-361)
none	27.0	27.7
some	38.3	33.0
much	34.8	39.3
Political witchhunting	(*N*-220)	(*N*-347)
none	49.1	51.0
some	30.0	28.0
much	20.9	21.0
Church-state relationships	(*N*-222)*	(*N*-342)
none	59.0	69.9
some	31.1	23.4
much	9.9	6.7
Assimilation	(*N*-228)	(*N*-360)
none	35.5	34.4
some	34.2	32.2
much	30.3	33.3
Anti-Semitism	(*N*-231)	(*N*-365)
none	33.8	26.8
some	47.6	53.2
much	18.6	20.0
Educational system	(*N*-226)	(*N*-346)
none	61.5	67.6
some	31.9	25.1
much	6.6	7.2
Dating and marriage	(*N*-225)	(*N*-351)
none	62.7	57.3
some	28.4	27.1
much	8.9	15.7
Dependence on family	(*N*-224)*	(*N*-351)
none	62.1	72.1
some	29.9	22.2
much	8.0	5.7

* Chi square significant difference = .05.

"other" (unspecified) home backgrounds included 9.9 percent of returnees and 7.6 percent of permanent residents.

Question 4 is negated. Returnees are more disturbed by church-state relations, and dependence upon family. There is no significant difference concerning seven other disturbing factors of American life: materialism, conformity, political witchhunting, assimilation, anti-Semitism, educational system, dating and marriage (see Table 3).

Question 5 is negated. More returnees came to live in Israel on their first trip than did permanent residents. More permanent residents came to live on their second and third trip than did returnees. Also more permanent residents came to live years after their initial trip than did returnees (see Table 4).

There is also a significant difference regarding age when making initial trip to Israel. More permanent residents, 18.3 percent, came at an older age (35 years and over) than returnees, 10.5 percent; fewer permanent residents, 55.5 percent, came at a younger age (under 24) than returnees, 62.5 percent (chi square .025). There is similarity in the 25 through 34 age range: 26.2 percent of permanent residents as compared to 27.0 percent of returnees.

No group difference was observed concerning those who had lived in lands

TABLE 4
FACTS CONCERNING EMIGRATION

	Percentages	
Question	Returnees in America (*N*-256)	Permanent residents in Israel (*N*-443)
Lived in other lands:	(*N*-254)	(*N*-429)
no	89.0	89.7
yes	11.0	10.3
Came to live in Israel on:	(*N*-255)**	(*N*-441)
first trip	63.1	41.7
second trip	31.0	42.2
third trip or more	5.9	16.1
Years after first trip came to live in Israel:	(*N*-254)**	(*N*-437)
on first trip	61.0	42.6
1-4	24.4	32.7
5 or more	14.6	24.7
Arrived in Israel (overlapping cells):	(*N*-312)	(*N*-558)*
alone	27.6	33.0
with group	12.2	8.6
spouse	35.9	29.2
children	20.8	22.8
parents	3.5	6.4

* Chi square significant difference = .05.
** Chi square significant difference = .001.

other than Israel. About a tenth of each group had lived in other lands (see Table 4). More permanent residents came to Israel alone, while more returnees came with spouse (see Table 4).

D. Discussion

Cognitive consistency suggests some Americans who are attracted to Israel are more likely to return to America after living in Israel because of their closer identification with American society. This greater identification exists even though returnees experience greater dissonance from disturbing facets of American life.

More returnees' parents were native-born Americans. More returnees went on to postgraduate secular schooling, fewer had more intensive elementary Jewish parochial school education. More returnees affiliated with Hillel, the collegiate organization. Religious identification of returnees in America was more conservative (less orthodox); conservative Judaism is an American innovation. More returnees before going to Israel were married, spouses providing additional reasons to come "home." Returning to America is predictable consistent behavior for individuals who express greater attachment to America than those who remain permanently in Israel.

More secular schooling for returnees (see Table 1) implies greater orientation to the American way. In addition, "overtrained" personnel find suitable employment more easily in America than in a developing country. Israelis with considerable education often find career opportunities in America attractive.

By contrast, those who receive intensive Jewish education (parochial or day school) during primary years more readily remain in Israel. However, those who go on to advanced studies have less need for Israel's supportive Jewish environment.

Intensive Jewish education is reflected in speaking knowledge of Hebrew at time of emigration. Knowing Hebrew influences Americans to remain in Israel. However, inability to communicate in Hebrew upon arrival in Israel does not differentiate returnees from permanent residents (see Table 1).

The more ties to the native land the more dissonance in remaining in Israel. Those who have more native parents, or native spouses are drawn back to America. Those who also find America accommodating return. Even organizations designed to promote immigration to Israel (aliya) become vehicles for accommodation. Zionist groups in America have not fulfilled their ideological purpose (8).

The more traditional Jew feels himself in Diaspora (exile). The less traditional are more at ease as Jews in America. Identification with traditional Judaism reduces attachment to other lands and increases the need to be in a totally Jewish environment.

Those who identified more readily with America—returnees—nevertheless, went to Israel because they were more critical of life in America than those who remained in Israel. Returnees were more troubled by signs of increasing church-state relations and by dependence on family, and were equally upset by other disturbing facets of American life.

Perhaps returnees include a greater number who wanted to get away from America for a limited period of time. They were therefore less apprehensive about leaving America. They made their decisions at an earlier age and in fewer trips.

Subjects of this study felt uneasy about life in America experiencing increasing dissonance. They attempted to reduce their level of anxiety by living in Israel. Some return to America at least in part because of greater attachment to lands of their birth, which had created counter-dissonance for them while living in Israel.

Permanent residents, more of whom were orthodox while in America, received more intensive elementary Jewish schooling but less postgraduate secular schooling in America. Permanent residents were less rooted in America having fewer native American parents, and fewer spouses upon arrival in Israel, while fewer affiliated with the Jewish campus community (Hillel). Those who returned to America though more rooted in America, were, before moving to Israel, more critical of aspects of American life than those who became permanent residents of Israel.

REFERENCES

1. BREHM, J. W. Increasing cognitive dissonance by a *fait accompli*. *J. Abn. & Soc. Psychol.*, 1959, **58**, 379-382.
2. ENGEL, G. Comparison between American permanent residents of Israel: Part I, American background. *J. of Psychol.*, 1969, **71**, 133-142.
3. ———. Comparison between American permanent residents of Israel: Part II, Israeli background. *J. of Psychol.*, 1969, **72**, 135-139.
4. ———. Comparison between American permanent residents of Israel: Part III, Predictions about America and Israel. *J. of Psychol.*, 1969, **73**, 33-39.
5. FRENCH, J. R. P., JR., & SHERWOOD, J. Self-actualization and self-identity theory. Institute paper No. 107, Institute for Research in the Behavioral, Economic, and Management Sciences, Purdue University, Lafayette, Indiana, April, 1965.
6. GLAZER, N. The Jewish role in student activism. *Fortune*, 1969, **79**(1), 112-113.
7. KELMAN, H. C. The induction of action and attitude change. *Proceedings of the XIV International Congress of Applied Psychology, Copenhagen, Denmark*, 1961, 81-110.
8. KOPECKY, J. Integration of Americans into kibbutz life. Unpublished paper, Hon-

ors Seminar No. 95, Interdisciplinary Colloquium CO 5, Queens College, New York, November 27, 1968.

9. Lazerwitz, B. Some factors in Jewish identification. *Jewish Soc. Stud.*, 1953, **15**, 3-24.

10. Lewin, K. Psycho-sociological problems of a minority group. *Resolving Social Conflicts*. New York: Harper, 1948, Chap. 9, Pp. 145-158.

11. Meyerson, M. The ethos of the American college student: Beyond the protests. *Daedalus,* Summer 1966, issued as Vol. 95, No. 3, of the Proceedings of the American Academy of Arts and Sciences, 713-739.

12. Mills, J., Aronson, E., & Robinson, H. Selectivity in exposure to information. *J. Abn. & Soc. Psychol.*, 1959, **59**, 250-253.

13. Morrill, R. G. Group identity, marginality, and the nonprofessional. *Archives Gen. Psychiat.*, 1968, **19**(4), 404-412.

14. Patchen, M. Organizational Identification: Its Meaning and Determinants. Englewood Cliffs, N.J.: Prentice-Hall. In press.

15. Pincus, L. A. The realities of Western aliyah (responsibilities of Israel). *Jewish Frontier,* 1969, **36**(6), 17-22.

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CLOZE AND CLOSURE: A FACTORIAL STUDY*

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A. INTRODUCTION

Since Taylor (21) first developed the cloze technique, it has been employed in a number of ways ranging from assessing the readability of prose (3) to the construction of instructional exercises for teaching remedial reading (2). The technique has been used to measure general reading achievement (19), specific reading comprehension (23), information gain as a function of reading (19, 23), and a tool for clinical diagnosis (14).

The cloze technique is accomplished by deleting words from a prose passage (usually in some mechanical fashion) and asking a reader to determine what words have been removed. An every nth word deletion is frequently undertaken, but depending upon the purpose of the investigation or task, many variations are possible. Rankin (20) notes that the term "cloze" is derived from the gestalt term closure. A naive psychology leads to a straightforward interpretation of a subject's performance on a cloze task. To wit, when an *S* fills in the gaps of an incomplete structure (supplies words for the deleted terms in a cloze exercise) he has effected closure. On the basis of a task analysis, Rankin (20) suggested that perceptual cloze factors are more relevant to a young child's response to cloze tasks than are cognitive closure tasks whereas cognitive closure factors would be more relevant to an explanation of adult *S*s' performance. Unfortunately, the cognitive closure factors alluded to are vaguely defined and it is not clear how one would resolve questions concerning their importance to success in responding to cloze passages. Such is not the case with respect to the visual closure factors. The work of Thurstone (24), Bechtoldt (1), Botzum (4), and Pemberton (18) all testify to the existence, in our culture at least, of two identifiable visual closure factors, called speed of closure and flexibility of closure. Of the two, speed of closure appears to be a purely perceptual factor whereas the flexibility of closure factor has been found to be related to analytic-ability and/or deductive reasoning (4, 18). Field independence, a construct strongly related to flexibility of

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closure and assessed, in part, with similar tests, has been implicated as a factor of importance in a wide variety of behaviors (25). Further, Goins (11) found that a measure of flexibility of clozure made a contribution to the prediction of early reading achievement. To the extent that perceptual factors are mobilized in responding to cloze tasks, Rankin (20) reasoned that flexibility of closure should facilitate the testing of various hypotheses regarding possible solutions when confronted with the task demands of cloze.

The present study explores the relationship of flexibility of closure and speed of closure to a number of cloze tasks representing structural, lexical, concrete, and abstract deletions. Since factor analysis was to be the mode of analysis, several measures representing facets of verbal aptitude were included to insure representation of the verbal domain in addition to the cloze tasks themselves. Measures of verbal comprehension and associational fluency were included in the assessment battery. Through their inclusion, it was hoped that separable portions of cloze variation could be identified representing communality with verbal and perceptual factors.

B. Method

With the exception of the cloze tasks, two measures for each perceptual and verbal factor to be represented in the battery were selected from the Kit of Reference Tests for Cognitive Factors (10). Two tests for each factor were selected in an effort to insure adequate marking of factors. A brief definition of each factor and the tests employed to measure them follows.

1. *Speed of Closure*

The speed of closure factor is defined as the ability to unify an apparently disparate perceptual field into a single percept.

a. Gestalt Completion Test (test suggested by the Street Gestalt Completion Test). Drawings are presented which are composed of black blotches representing parts of the objects being portrayed. The subject writes down the name of the objects, being as specific about them as he can. The test consists of two parts having 10 pictures each. A time limit of three minutes for each part is imposed.

b. Concealed Words Test (test suggested by Thurstone's Mutilated Words). Words are presented with parts of each letter missing. The subject is to write out the full word in an adjacent space. The test has two parts of 25 words each with a three-minute time limit for each part.

2. *Flexibility of Closure*

The flexibility of closure factor is defined as the ability to keep one or more definite configurations in mind so as to make identification in spite of perceptual distractions.

a. Hidden Patterns Test (test suggested by Thurstone's designs). Each item consists of a given geometrical pattern in some of which a single given configuration is embedded. The task is to mark each pattern in which the configuration occurs. These are easy items given under speeded conditions. There are 200 patterns with a two-minute time limit.

b. Hidden Figures Test (Adaptation of the Gottschaldt Figures Test popularized by Thurstone). The task is to decide which of five geometrical figures is embedded in a complex pattern. The difficulty level of this test is high. The test has two parts with 16 items each. Ten minutes is allowed for each part.

3. *Associational Fluency*

The associational fluency factor is the ability to produce words from a restricted area of meaning.

a. Controlled Associations Test (test adapted from Thurstone's test of this name). The task is to write as many synonyms as possible (up to 12) for each of four words. The test has two parts consisting of four stimulus words each. Six minutes are given for each part.

b. Association IV (a test by J. P. Guilford). The task is to produce a word that is associated with both the two given words but which has a different meaning in its relationships to each of them. The two parts of the test consist of 15 paired stimuli each and seven minutes are given for each part.

4. *Verbal Comprehension*

The verbal comprehension factor is defined as the ability to understand the English language (10).

a. Wide Range Vocabulary Test (adopted from Cooperative Vocabulary Test). This is a five-choice synonym test having items ranging from very easy to very difficult. The two parts are separately timed at six minutes and have 24 items each.

b. Advanced Vocabulary Test (adopted from a test by J. B. Carroll). This is a four-choice synonyms test consisting mainly of difficult items. Each of two parts has 18 items with a four-minute time limit.

5. *The Cloze Tests*

All cloze tests were, so-called, "pretests." That is, the *S*s did not read the relevant passages in their intact form before attempting to complete the deleted units. A standard underline of 15 spaces was substituted for deleted words, and *S*s recorded their responses directly on the test pamphlets.

The cloze materials were constructed from materials which had previously been ordered by difficulty level by means of the cloze procedure (17). The 36, 150-word passages were divided into four groups of nine passages each. Sets of three sentences each were drawn from each of these four levels of difficulty until the required number of deletions were obtained.

a. Structural cloze. This is an "any-word" deletion which follows Taylor's (22) original technique. Every fifth word is deleted regardless of its grammatical relationship. Rankin (19) argues that this type deletion will sample more function words than content words as function words are more numerous in the language. Taylor (23) has shown that this deletion correlates more closely with intelligence test measures than does lexical deletions.

b. Lexical cloze. This deletion is constructed by first identifying all the nouns, verbs, and adjectives in the passage and then eliminating every fifth noun, verb, or adjective. Taylor (23) has shown that this deletion correlates more closely with achievement measures than does a structural deletion.

c. Abstract nouns. Coleman (8) has elaborated a technique for identifying abstract nouns. In essence, though, the definition is adequate for the categorization. Abstract nouns describe "objects" that cannot be perceived by the senses (8). In the present study, abstract nouns in the passages were identified first, and then a mechanical fifth-word deletion of these nouns carried out.

d. Concrete nouns. There are indications from the work of Gray and Leary (12) and of Coleman (8) that abstract nouns and concrete nouns perform different functions. Concrete nouns were first identified (by choosing those nouns which did describe objects perceivable by the senses) and every fifth concrete noun deleted.

The test battery was administered over three separate 1-½ hour sessions within a period of two weeks. The sample consisted of 113 high school students, spanning grades 9 through 12, attending a semirural school in Northeastern Georgia. Cloze scores were taken as the number of words exactly reproduced. Tests in the battery were scored following directions given in the *Manual for Kit of Reference Tests for Cognitive Factors* (10).

The data thus obtained were correlated and the resulting matrix subjected to a principal component analysis with unities in the main diagonal. Following the suggestion of Kaiser (15, 16) components with latent root $\geqslant 1.00$ were rotated to the varimax criterion which represents an orthogonally rotated solution which seeks to satisfy simple structure criteria. The nature of the test battery suggested that it would probably subsume correlated factors. To evaluate this expectation, the varimax solution was further rotated to the maxplane criterion (9). Maxplane produces an oblique rotation which permits factors to be correlated.

The latent root $\geqslant 1.00$ rule for cessation of factoring has come under criticism as tending to result in a solution which retains too few factors especially when the number of tests in a battery is small (6, 13). Accordingly, a second criterion for cessation of factoring was employed as a check on the original solution produced. It was decided to employ the Scree criterion (6). Application of the Scree criterion argued for the retention of three and possibly four principal components, whereas the latent root $\geqslant 1.00$ criterion called for the retention of two components of rotation. As a result, it was decided to evaluate all three possibilities, rather than any one, in the hope that one of the solutions would be most compelling. Parenthetically it might be added that many factor analyses are reported as though the number of factors problem is resolved through the routine application of a seemingly analytic rule for the cessation of factoring. Results are then reported and take on an aura of definitiveness. With the data we shall report no such claims are made, but, rather, we hope to show that various solutions have differential psychological interpretations within the framework of the study's major purpose.

C. FINDINGS

Descriptive statistics including means, standard deviations, and the correlations among all variables are presented in Table 1.

Inspection of the matrix of correlations discloses that 59 out of 66 correlations are significant ($p < .05$). Thus the data possess strong positive manifold, lending credence to the notion of a general factor underlying the system of correlations or several correlations or several correlated factors. The means for the structural and concrete cloze tasks are both higher when compared with the means for lexical and abstract deletions. This is consistent with the often observed finding that structural deletions are easier to fill in than lexical deletions. The other test means are generally consistent with differential difficulties to be expected when each pair of factor tests are compared.

Let us turn now to a consideration of the various factor solutions. Here

TABLE 1
Correlations Among Variables with Associated Means and Standard Deviations

	1	2	3	4	5	6	7	8	9	10	11	12	$\overline{X}$	*SD*
1. Cloze I-Structural	—	42	48	45	24	28	27	40	50	38	42	34	14.56	7.84
2. Cloze II-Lexical		—	42	52	24	25	15	22	44	34	48	45	7.53	4.03
3. Cloze III-Concrete			—	49	27	20	24	32	44	36	39	37	16.22	7.21
4. Cloze IV-Abstract				—	24	32	21	28	37	44	53	42	12.51	5.58
5. Gestalt Completion					—	42	45	38	38	28	26	28	16.34	5.81
6. Concealed Words						—	55	46	39	35	33	36	13.80	4.29
7. Hidden Patterns							—	47	20	18	32	22	42.93	22.06
8. Hidden Figures								—	32	32	43	31	4.93	5.11
9. Controlled Associations									—	45	40	42	14.72	7.82
10. Associations IV										—	38	45	4.80	3.61
11. Wide Range Vocabulary											—	69	7.41	5.75
12. Advanced Vocabulary												—	4.37	4.60

Note: $N = 113$, $r \geqslant .24$, $p < .05$.

TABLE 2
TWO FACTOR SOLUTION

Variable	Varimax			Maxplane Primary pattern	
	I	II	h^2	I	II
Cloze I-Structural	65	24	48	04	68
Cloze II-Lexical	74	05	56	—19	82
Close III-Concrete	68	15	48	—06	72
Cloze IV-Abstract	75	13	57	—11	80
Gestalt Completion	21	68	51	67	08
Concealed Words	24	75	63	74	11
Hidden Figures	30	68	55	64	18
Hidden Patterns	07	83	70	88	—10
Controlled Associations	64	29	49	10	64
Associations IV	61	24	43	05	63
Wide Range Vocabulary	70	28	58	07	72
Advanced Vocabulary	69	22	53	01	72

we shall simply present the solutions descriptively reserving discussion for a later section. Table 2 presents the two factor solution rotated to both the varimax and maxplane criterion.

Application of the latent root $\geqslant 1.00$ rule called for the retention of but two components for rotation. The varimax solution and the maxplane results are quite similar although the maxplane configuration is cleaner from the simple structure point of view. Essentially the solutions indicate a general cloze factor with substantial loadings for the verbal comprehension tests as well as the associational fluency measures. A second factor representing the perceptual measures is also in evidence. Although distinguishable here as a separate cluster of tests, the maxplane rotation for the two factors produces a correlation of .47 between the two factors.

As previously mentioned, application of the Scree test argued for the retention of three or four components for rotation. Accordingly solutions for three and four factors were attempted. The varimax and maxplane results for the three factor solution are presented in Table 3 with correlations among the oblique factors reported in Table 4.

The three factor solution is somewhat more interesting in that several cloze tasks have loadings distributed over two factors. When considering the primary loadings for the maxplane solution, it is apparent that the first two factors are essentially identical with the factors identified in the two factor solution. As noted in Table 4, the correlation between the first two factors is .47, again identical with that found in the two factor solution. The third oblique factor is orthogonal to the first two and is bipolar in form. Contrary to the general trend for cloze tasks to be positively related to vocabulary as

TABLE 3
THREE FACTOR SOLUTION

Variable	Varimax I	Varimax II	Varimax III	h^2	Maxplane Primary pattern I	Maxplane Primary pattern II	Maxplane Primary pattern III
Cloze I-Structural	75	22	14	63	64	05	—43
Cloze II-Lexical	56	02	50	56	81	—19	—04
Cloze III-Concrete	75	14	17	61	68	—05	—40
Cloze IV-Abstract	56	10	50	57	80	—10	—04
Gestalt Completion	27	68	04	53	07	67	—16
Concealed Words	13	74	26	64	11	74	09
Hidden Patterns	05	83	10	70	—10	88	04
Hidden Figures	24	67	20	58	18	64	—03
Controlled Associations	69	27	18	58	61	11	—36
Associations IV	47	22	40	43	63	05	—05
Wide Range Vocabulary	24	25	81	79	76	07	40
Advanced Vocabulary	20	19	84	78	76	00	45

indicated by the loadings on Factor I, there is an artificial variable latent in the data which suggests a tendency for structural and concrete cloze performance to be inversely related with vocabulary.

The varimax three factor solution does not disclose this, but reiterates in another form the general finding that verbal comprehension (vocabulary) is more important in lexical and abstract performance (see Factor III) as compared to structural and concrete performance. None of the closure tasks loads substantially on either of the factors having substantial loadings for the cloze tasks, thus masking the underlying relationship disclosed in the oblique (maxplane) solution ($RI \cdot II = .47$).

Consider now the four factor solution presented in Tables 5 and 6. Although more complex than the two and three factor solutions, it perhaps presents a more comprehensive description of the underlying structure of the test space under consideration than the two and three factor solutions do. The increased comprehensiveness of the description is purchased at the expense of an increased redundancy with regard to the purity of the factors in the oblique solution (i.e., $RI \cdot III = .58$). In any event a similar depiction of the battery is evident when three and four factor varimax solutions are considered. Factor

TABLE 4
CORRELATIONS AMONG THREE FACTOR PRIMARIES

Factor	I	II	III
I	—	47	—01
II		—	—02
III			—

TABLE 5
FOUR FACTOR SOLUTION

Variable	Varimax					Maxplane Primary pattern			
	I	II	III	IV	h^2	I	II	III	IV
Cloze I-Structural	76	22	13	20	68	87	—01	—12	09
Cloze II-Lexical	50	—01	49	28	56	44	04	40	—16
Cloze III-Concrete	78	14	17	15	68	89	—08	—08	01
Cloze IV-Abstract	57	11	50	15	60	53	—11	39	—06
Gestalt Completion	08	57	01	53	62	07	52	—02	56
Concealed Words	00	68	23	40	67	—09	34	28	63
Hidden Patterns	12	86	09	00	77	12	—06	06	83
Hidden Figures	31	70	20	04	62	32	—09	12	62
Controlled Associations	43	14	15	71	72	44	58	03	—05
Associations IV	22	08	37	65	61	12	51	37	01
Wide Range Vocabulary	29	28	81	04	82	10	—23	87	09
Advanced Vocabulary	11	15	83	28	80	—12	05	95	—01

I in both solutions is a general cloze factor more heavily loaded than the two factor solution with structural and concrete variation with associational fluency contributing variation to the factor. Factor II in both instances is a perceptual closure factor. Factor III, in each case, represents a verbal comprehension factor with substantial loadings for the lexical and abstract cloze tasks. In both cases lexical and abstract cloze tasks and associational fluency have a complexity of two (complexity meaning a variable loading on a number of factors). The fourth factor in the last solution represents a bifurcation of a portion of the previously clean perceptual factor with a separation of a portion of the speed of closure measure along with a substantial portion of the variation of the associational fluency tasks. The maxplane solution essentially reproduces this state of affairs (with a renumbering of the factors) and, in addition, demonstrates that although separable the structural-concrete general cloze factor (Factor I) and the verbal comprehension, lexical-abstract factor (Factor III) are strongly correlated ($R_{I \cdot III} = .58$). Further, the perceptual factor (Factor IV) has small correlations with both the general cloze factor (Factor I) and the verbal-comprehension factor (Factor III).

TABLE 6
CORRELATION AMONG FOUR FACTOR PRIMARIES

Factor	I	II	III	IV
I	—	31	58	17
II		—	30	01
III			—	20
IV				—

D. Discussion

The reader may well ask, "Which solution shall I accept?" It could be argued, "All of them"—depending upon how much parsimony one requires, since heuristically all have appeal.

All the analyses presented in this study show some relationship of cloze factors to classical closure factors—flexibility of closure and speed of closure, with flexibility more closely related than speed. The strength of this relationship is not such, however, that one would be led to accept the classical gestalt explanation of visual closure phenomena as descriptive of the process of completing cloze blanks. It could as well be explained as a function of "g," according to Spearman. The cloze tasks are permeated, on the other hand, with the well-defined Verbal factor with its usual markers of Vocabulary and Associational tasks. It does not seem to add power to the explanation to designate the phenomena, with such weak relationships to perception, as "cognitive closure," for the analogy with gestalt presumptions about the nature of visual closure is tenuous and strained.

In their implications for language, the findings that a three or four factor solution breaks up the cloze tasks into two discriminable dimensions are much more important than attempting to relate the phenomena to visual closure. The "lexical deletion, abstract noun deletions," related to vocabulary, is one factor (in the varimax solution), while the "structural, concrete noun deletions" are together in another factor. The "lexical, abstract noun, vocabulary" pairing is expected in terms of numerous previous findings; it is not obvious at all why structural and concrete noun conditions should hang together.

One intimation of why this might be so is given by a study of basal readers by Carterette and Jones (5). They showed that redundancy of basal readers is abnormally high, as compared with "normal" adult prose, for the first four grades. By the fifth grade the redundancy of the readers matches normal adult prose. An analysis of the reason for the high redundancy, however, has the most psycholinguistic significance. "Normal" adult prose generates its redundancy primarily by the proliferation of function words and bound morphemic forms. These are the recurrent—i.e., the frequent—elements in the language. The basal readers of the early grades, however, generate redundancy by the proliferation of concrete nouns, especially of proper names and fixed exhaustive categories: e.g., domestic animals. It has been shown (7) that subjects who receive lists of categorically-defined items to recall (interspersed, of course, with distractors) tend to recall all the items in a category or none. This implies some sort of linkage between category items, which implies that if one item is present in a context, the retrieval of the entire category of items is facilitated—limited, of course, by the subjects storage of particular items in the category. If in addition, the category is "exhaustive"—i.e., it contains a few, readily numerated items—retrieval is especially facilitated. Structural items, usually function words, are in this exhaustive category as many concrete nouns.

In part, this analysis is a criticism of the deletion pattern used in this study: i.e., the abstract noun, concrete noun categories. The argument now is that it is not the concreteness, the direct sensory contact with the sign referent, that binds concrete nouns with the structural deletion in one factor, but rather, the determinant of relationship is the category size of function word and concrete noun categories as opposed to abstract nouns. This is an empirical question on which study is continuing.

As noted in the introduction, cloze deletions have been used as measures of a host of constructs. In reality, the measure is simply a count of fill-ins of deleted items, and in this sense every cloze test is the same. This is a trivial sense, however. The fact that there is so much comment in the cloze literature on the advantage of mechanical deletions (ostensibly to obtain objectivity) indicates that many researchers are not sensitive to the issue of deleting without rationale. In our deletion patterns a structural deletion is considered to sample a construct "structure of language" because it removes function words which seem to have a great deal to do with language organization. A lexical deletion is considered to sample a different construct, "comprehension," because nouns, verbs, and adjectives seem to have a good deal to do with such "comprehension" components as vocabulary. On the other hand, the fact that responses to cloze tasks reflecting essentially gross deletion strategies align themselves with crude measure of comprehension does little to shed light upon the fundamental nature of comprehension other than to indicate that one can measure what passes for comprehension in more than one way. Abstract nouns were deleted in a separate treatment from concrete nouns because the operation of these elements in the language seemed to be different. No claim is made that these deletions are the most important ones, or that they should be used by other experimenters. In fact, the measurement possibilities of the cloze procedure do not seem at all adequately exploited by these deletions. Researchers using the cloze procedure ought to give careful consideration to language operations and to rational operations which are implicit in verbal activity and they should construct deletion patterns which seem to relate to these operations. Rather than standardizing a particular cloze deletion type, exploration of a wider range of deletion types which are related to particular linguistic and psychological hypotheses is needed.

As a final methodological note, it would seem that a rule for the cessation of factoring, arbitrarily applied, might best be avoided in favor of the application of several such criteria. This is probably especially true where an investigation is frankly exploratory as in the present case. In some instances, it would seem that routine application of a single rule runs the risk of masking potentially useful findings.

E. SUMMARY

A sample of 113 high school students were administered four cloze passages representing structural, lexical, abstract noun, and concrete noun deletion patterns. Further, measures of flexibility of closure, speed of closure, associational fluency, and verbal comprehension were also obtained. Several factor analytic solutions with both orthogonal and oblique rotations are presented. Findings suggest that cloze factors and perceptual closure factors are moderately correlated and that cloze tasks can be differentiated into at least two discriminable dimensions. Both substantive and methodological implications of the present study for the study of language are discussed.

REFERENCES

1. BECHTOLDT, H. P. Factorial study of perceptual speed. Unpublished Doctoral dissertation, University of Chicago, Chicago, Illinois, 1947.
2. BLOOMER, R. H. The cloze procedure as a remedial reading exercise. *J. Devel. Read.*, 1962, **5**, 173-181.
3. BORMUTH, J. R. Cloze as a measure of readability. *International Reading Conference Proceedings,* 1963, **8**, 131-134. New York: Scholastic Magazines.
4. BOTZUM, W. A. A factorial study of reasoning and closure factors. *Psychometrika,* 1951, **16**, 361-386.
5. CARTERETTE, E., & JONES, M. H. Redundancy in children's texts. *Science,* 1963, **140**, 1309-1311.
6. CATTELL, R. B. The Scree test for the number of factors. *Multivar. Behav. Res.,* 1966, **1**, 245-276.
7. COHEN, B. H. All-or-none characteristics of coding behavior. Paper presented at a symposium *Coding and Conceptual Processes in Verbal Learning* at the American Psychological Association Annual Meeting, Los Angeles, California, September 8, 1964.
8. COLEMAN, E. B. Developing a technology of written instruction: Some determiners of the complexity of prose. In E. Z. Rothkopf (Ed.), *Symposium on Verbal Learning and Written Instruction.* In press.
9. EBER, H. W. Toward oblique simple structure: Maxplane. *Multivar. Behav. Res.,* 1966, **1**, 112-125.
10. FRENCH, J. W., EKSTROM, R. B., & PRICE, L. A. Manual for Kit of Reference Tests for Cognitive Factors. Princeton, N.J.: Educational Testing Service, 1963.

11. GOINS, J. T. Visual Perceptual Abilities and Early Reading Progress. Chicago, Ill.: Univ. Chicago Press, 1958. (Supplementary Educational Monographs No. 87).

12. GRAY, W. S., & LEARY, B. E. What Makes a Book Readable. Chicago, Ill.: Univ. Chicago Press, 1935.

13. HUMPHREYS, L. G. Number of cases and number of factors: An example where N is very large. *Educ. Psychol. Meas.*, 1964, **24**, 457-466.

14. JENKINSON, M. E. Selected processes and difficulties in reading comprehension. Unpublished Doctorate dissertation, University of Chicago, Chicago, Illinois, 1957.

15. KAISER, H. F. The varimax criterion for analytic rotation in factor analysis. *Psychometrika,* 1958, **23**, 187-200.

16. ————. The application of electronic computers to factor analysis. *Educ. Psychol. Meas.*, 1960, **20**, 141-151.

17. MILLER, G. R., & COLEMAN, E. B. a set of 36 passages calibrated for comprehensibility. *J. Verb. Learn. Verb. Behav.,* 1966, **5**, 241-248.

18. PEMBERTON, C. L. The closure factors related to other cognitive process. *Psychometrika,* 1952, **17**, 267-288.

19. RANKIN, E. F. An evaluation of the cloze procedure as a technique for measuring reading comprehension. Unpublished Doctoral dissertation, University of Michigan, Ann Arbor, Michigan, 1957.

20. ————. Closure and the cloze procedure. *College and adult reading, North Central Reading Association Yearbook,* 1965, **3-4**, 54-84.

21. TAYLOR, W. L. Cloze procedure: a new tool for measuring readability, *Journalism Quart.* 1953, **30**, 415-433.

22. ————. Application of "cloze" and entropy measures to the study of contextual constraints in samples of continuous prose. Unpublished Doctoral dissertation, University of Illinois, Urbana, Illinois, 1954.

23. ————. "Cloze" readibility scores as indices of individual differences in comprehension and aptitude. *J. Appl. Psychol.* 1957, **41**, 19-26.

24. THURSTONE, L. L. A Factorial Study of Perception. Chicago, Ill.: Univ. Chicago Press, 1944.

25. WITKIN, H. A., DYKE, F. B., FATERSON, H. F., GOODENOUGH, D. R., & KARP, S. A. Psychological Differentiation. New York: Wiley, 1962.

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CONCEPT ATTAINMENT AND KNOWLEDGE OF RESULTS*

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A. INTRODUCTION

It has become a principle of learning that knowledge of results (KR) enhances performance (1, 10, 16), specifically as a function of its completeness (8). Research in this area has dealt primarily with motor or verbal learning. Bilodeau and Bilodeau (3) showed that performance on a motor task varied as a function of the number of trials on which KR was given. Performance was found to improve as frequency of KR increased and to deteriorate when KR was withdrawn. In a later experiment (4), they found that preliminary trials with no KR did not aid *S* in learning the task after KR became available.

Studies dealing with KR and concept attainment have not produced such clear-cut results. KR has been found to facilitate (9), interfere with (6), and to have no effect on (18) concept attainment. This is due in part to the confounding of KR frequency with pretraining (15) and KR completeness (5), which has produced noncomparable results.

The present study was designed to investigate the relationship between frequency of KR and concept attainment, with the use of a task introduced by Bruner, Goodenough, and Austin (7). In this procedure, *S* is presented with an array of cards on which the various combinations of a number of attributes (color, size, etc.) are represented. *S*'s task is to sort the cards according to some common feature (the "concept") specified by *E*. The number of choices required by *S* to complete this categorization process is a measure of the efficiency with which the concept is attained.

This procedure is particularly appropriate for studying the effects of KR since *S* receives feedback on each choice that *E* says "right" or "wrong." The frequency of KR, then, can be manipulated by varying the number of choices on which *S* receives feedback.

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B. EXPERIMENT *I*

1. *Hypothesis*

It was hypothesized that frequency of KR would be negatively related to the number of card choices required by *S* to attain a concept.

2. *Method*

a. Subjects. Thirty-two undergraduate students served as subjects.

b. Stimuli. One hundred and twenty-eight 3″ × 3″ cards were designed with the following attributes:

(1). *Border.* Half the cards showed a black border and half the cards did not.

(2). *Diagonal.* Half the cards had a black diagonal line and half the cards did not.

(3). *Shape.* Half the cards showed a square figure in the center and half the cards showed a round figure.

(4). *Size.* Half the figures were one inch in size and half the figures were one half inch in size.

(5). *Color.* Half the figures were green and half were red.

(6). *Dot.* Half the cards showed a white dot in the center of the figure and half the cards did not.

(7). *Triangle.* Half the cards showed a small black triangle in the lower right corner and half the cards did not.

The attributes were distributed on the cards so that all possible combinations of the seven attributes were represented and no two cards were alike. A concept consisted of the joint presence of two attributes. Preliminary testing indicated that concepts containing two negative attributes, such as "no border and no diagonal," were most difficult to attain, while concepts containing two positive attributes, such as "border and diagonal," were easiest. This variable was systematically introduced into the study by including concepts of various levels of difficulty. The concepts used were (*a*) large figure and triangle (two positive attributes); (*b*) small figure and no dot (one positive and one negative attribute); (*c*) circle and no diagonal (one positive and one negative attribute); (*d*) no dot and no triangle (two negative attributes). Each concept was represented on 32 and only 32 of the 128 cards.

c. Design. Four KR frequencies and the four concepts were combined in a Graeco-Latin Square and seven other squares were permuted from it for a total of eight different squares. The four KR frequencies were: KR on every card chosen (1/1), KR on every second card chosen (1/2), KR on every fourth card chosen (1/4), and KR on every eighth card chosen (1/8).

d. Procedure. The 128 cards were displayed in an 8 × 16 matrix on a table in front of *S*. Beside the matrix to the right of *S*, a 4 square by 8 square checkerboard was placed. The following instructions were then read by *E*.

"I will have in mind a particular combination of two and only two of the seven characteristics shown on these cards. I will call this combination a concept. There are 32 cards which fit each concept. I will show you one of the cards which fits the concept. The problem will be solved when you have all 32 of these correct cards—and no incorrect cards—on your right."

S was then informed of the frequency with which he would receive KR and was shown one of the cards which fit the concept. *S* then chose cards one by one and placed them in successive squares on the checkerboard beside the matrix. For the highest KR frequency (1/1), *E* said "right" or "wrong" for each choice depending on whether that card showed or did not show the concept. For KR frequency 1/2, information was given only on every second choice; for KR frequency 1/4, information was given only on every fourth card choice; and for KR frequency 1/8, information was given only on every eighth card choice. *S* continued until he correctly identified all 32 cards which showed the concept. However, he was considered to have "attained the concept" at the point beyond which he made all right choices.

3. *Results and Discussion*

Since the only responses common to all KR frequencies were the card choices on which *S* received KR, it was decided to score only the KR card choices. To have counted every card choice would have unfairly penalized the low KR frequencies due to the large number of card choices in these conditions on which *S* received no feedback.

The measure of concept attainment performance was the number of KR card choices required to reach the point beyond which all the choices were correct (performance score).

An analysis of variance (2) of the performance scores indicated a significant effect of three variables: KR frequency, practice, and concept difficulty. The effects of practice and concept difficulty were as expected; performance improved with practice ($p < .05$) and concepts made up of negative characteristics were more difficult to attain than those made up of positive characteristics ($p < .05$).

The effect of KR frequency, however, was opposite to prediction ($p < .05$).

Concepts were attained in fewer card choices as KR frequency decreased (see Figure 1). Thus, *S*s showed better concept formation performance when they received KR on every eighth card choice than when they received KR on every card choice.

Because of this unexpected finding, the data were re-examined. From each *S*'s sequence of card choices, the point was determined at which all the information necessary to attain the concept was available. The number of KR card choices between this point and the point at which *S* actually did attain the concept was computed. This score (the Difference Score, or D-Score) represented the efficiency with which *S* utilized the information available to him from his choices in attaining the concept. An analysis of variance of the D-Scores showed a significant decrease ($p < .05$) in this measure as KR frequency decreased (see Figure 2). These data suggest that with less frequent KR, the information is used more efficiently and concept formation performance improves. Since only KR cards were scored, however, it was possible that the better performance in the 1/4 and 1/8 KR frequency con-

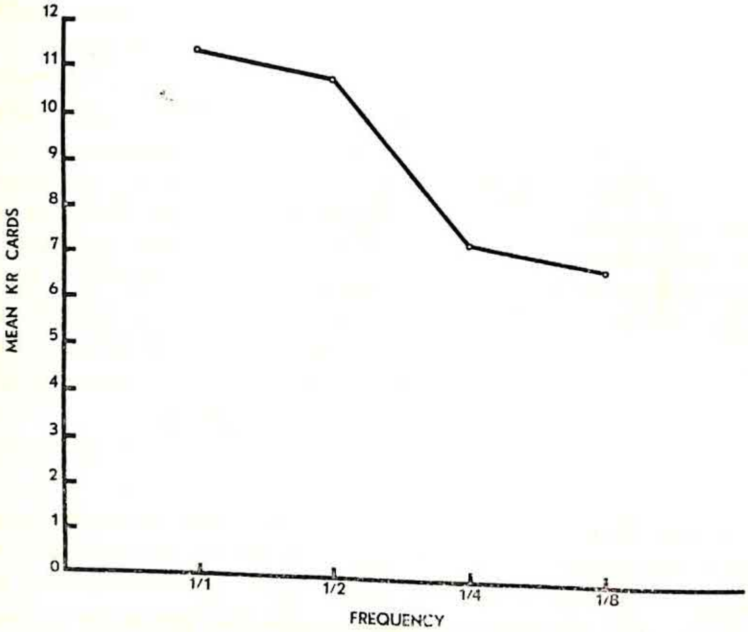

FIGURE 1
MEAN NUMBER OF KR CARDS REQUIRED TO ATTAIN THE CONCEPT FOR EACH KR FREQUENCY

ditions was due to more chosen cards being available for comparison by *S* which were not included in his score.

It was decided to test the relationship between frequency of KR and efficiency of information utilization in concept formation in a study which avoided this possible artifact.

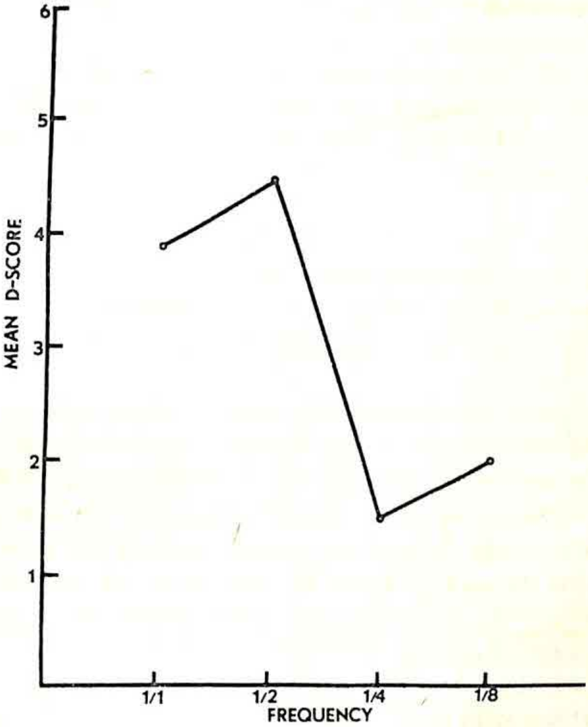

FIGURE 2
MEAN D-SCORE FOR EACH KR FREQUENCY

C. EXPERIMENT II

1. *Hypothesis*

It was hypothesized that restricting the number of choices on which *S* received KR while forming a concept increased the value of that information, resulting in more efficient use being made of it. In conjunction with this hypothesis, it was felt that two additional factors must be taken into consideration. The first was the instructions given the subjects, since instructional set has been shown to be an effective variable in problem solving and concept formation studies (11, 13, 14, 17). In the present research it was felt that knowing whether or not the problem was solvable with a restricted number of card choices would affect *S*'s performance. This variable was introduced into the study by constructing two sets of instructions, only one of which included the information that the concept could be attained with the restricted number of choices given *S*.

The second factor to be considered was whether a strategy for attaining a concept under limited KR would transfer to a concept attainment situation with unlimited KR. To test this effect, a transfer session was included in the design, and it was hypothesized that experience with limited KR in a concept attainment task would result in more efficient concept attainment performance when KR was unlimited.

2. *Method*

a. Subjects. Forty summer school students served as subjects. The twenty-eight males and twelve females were paid for their time.

b. Stimuli. The same cards were used in Experiment II as had been used in Experiment I.

c. Design. In this study, "limited KR" was defined as being limited to six card choices in which to attain the concept. "Unlimited KR" operationally meant an unlimited number of card choices. In both cases, a KR frequency of 1/1 was used. Three sessions were run. In Session I, all subjects were given unlimited KR but half the subjects received instructions which included the information that the concept could be attained in six card choices (instructions A) and half the subjects received instructions which did not include this information (instructions B). This session served to test the effects of instructional set alone, and also oriented the *S*s in the task and gave them "equal" experience with it.

In Session II, half of instructions "A" group and half of instructions "B" group served collectively as an experimental group. *S*s in this group were given limited KR after which they were required to tell *E* the concept. The other half of each instruction group served as a control group and was given unlimited KR. This session served to test the effects of limited KR, instructional set, and their interaction.

Session III replicated Session I. That is, all *S*s were again given unlimited KR in attaining the concept. However, half the subjects had now had experience with limited KR, while the other half were experiencing their third session with unlimited KR. Session III tested the transfer effect of experience with limited KR to a task with unlimited KR.

d. Procedure. Concept difficulty was controlled by using only those made up of one positive and one negative characteristic. The concepts used were Session I: Circle and no diagonal; Session II: Large figure with no triangle; Session III: Small figure with no dot.

(1). *Session I.* The stimuli were arrayed in front of *S* in the same manner as Experiment I. The same general instructions were used as in Experiment I, except that the following sentence was added to Instructions "A": "Although 32 cards are needed to fill the board, it is possible to 'get' the concept in 6 choices." Instructions "B" did not include this sentence.

A focus card was shown *S* and he proceeded to choose cards from the array in front of him while *E* said "right" or "wrong" for each choice. When *S* had separated out all the cards from the array which showed the concept the session was ended.

(2). *Session II.* The control group continued to perform the same task as in Session I. *S*s in the experimental group, however, were informed that they would have limited KR, allowing them only six card choices to attain the concept. KR frequency was 1/1. Once *S* had made his six choices, he was required to tell *E* the concept. *S* was not told whether he was right or wrong, but was told to continue choosing cards, and *E* told him "right" or "wrong" on each choice. Again, the session was ended when *S* had separated out the 32 cards which showed the concept from the array of 128 cards.

(3). *Session III.* Session III replicated Session I. All *S*s were again given unlimited KR in attaining the concept. For the control group this represented a third replication of the same task, while for the experimental group this session was a return to unlimited KR after the limited KR of Session II.

3. *Results*

As in Experiment I, both performance scores and D-scores were computed.

a. Session I. Session I served to orient the *S*s in the task and to test the effects of instructional set on performance at this task. It was predicted that instructions which included the information that the concept could be attained in six card choices would lead to better performance than instructions which did not include this information. An analysis of variance (12) of the scores and D-scores indicated no significant difference between the two sets of instructions.

b. Session II. An analysis of variance for factorial designs was applied to the performance scores and D-scores from Session II. No significant performance score differences were found between the experimental and control groups or between the two sets of instructions. The D-score data, however, showed a significant difference ($p < .05$) between the experimental and control groups (see Figure 3). *S*s in the experimental group, with limited KR, utilized the information available to them more efficiently than *S*s in the control group. This finding was in agreement with the hypothesis generated by the results of Experiment I. There was no significant D-score difference between the two sets of instructions.

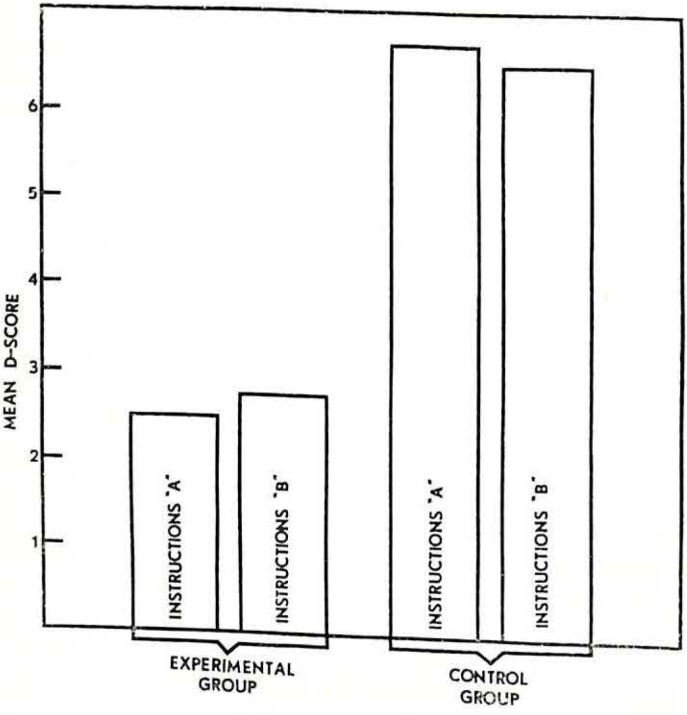

FIGURE 3
MEAN D-SCORE FOR EACH GROUP IN SESSION II

c. Session III. To test the effect of experience with limited KR on a task with unlimited KR, change scores from Session I to Session III were computed. No significant differences in performance score changes or D-score changes were found between the experimental and control groups or between the two sets of instructions. There was a tendency for the control group to show a greater improvement in the number of card choices required to attain the concept than the experiment group ($p < .10$).

4. *Discussion*

The primary hypothesis tested in Experiment II was that limited KR would increase the importance of the information available and lead to more efficient utilization of it in attaining the concept. The D-score data from Session II supported this hypothesis. However, the lack of significance in the performance score data from Session II indicates that the experimental group did not attain the concept in fewer card choices than the control group. Apparently, *S*s in the experimental group made better use of the information available to them only after they had made enough card choices to provide all the information necessary to attain the concept. The strategy used in choosing cards to get to this point was no more efficient for the experimental group than for the control group. Thus the hypothesis is only partially confirmed and further work is needed to explore the strategies used in making the first crucial card choices.

Instructional set did not have a significant effect on the concept attainment performance. The information that the concept could be attained in six card choices did not increase the efficiency with which *S* attacked the problem, even when, in Session II, he was restricted to only six card choices. A very large individual difference in approach to the problem was evident during the experiment, and overwhelmed any effect of instructional set. There were, however, two "types" of strategies which reflected the aspects of the task which were most influential in determining the sequence of card choices. Some *S*s were most influenced by the perceptual aspects of the task as shown by their tendency to concentrate on the most obvious geometric characteristics of the cards. Other *S*s took a more mathematical approach, eliminating characteristics one by one in a systematic manner. It was subsequently found that *S*s who were majoring in the natural sciences showed a significantly more efficient strategy than *S*s majoring in the social sciences or humanities ($p < .01$). The effect of formal training on strategies used in concept attainment should be explored in future research.

Experience with limited KR in Session II did not significantly improve the performance of the experimental group in Session III. Indeed, the control group showed slightly better performance in Session III than the experimental group. The lack of positive transfer on the part of the experimental group may be due to the disruptive influence of Session II. That is, the requirements of Session II, being different from those of Session I, provided a type of retroactive inhibition in the process of learning to attain the concept with unlimited KR. The control group, not having experienced a limited KR condition, was better able to apply any techniques developed in Session I and II directly to Session III. Further trials would be needed to discover whether the broader experience of the experimental group would prove to be an ultimate advantage.

D. Summary

Two experiments studied the relationship between concept attainment and the amount of KR. *S*s in the first experiment were required to sort cards to find all those on which a combination of attributes (the concept) was showing, with four different KR frequencies: KR every card choice (1/1); KR every second card choice (1/2); KR every fourth card choice (1/4); and KR every eighth card choice (1/8). Results showed a significant improvement in performance with a decrease in KR frequency. A second experiment attempted to confirm these findings with a technique that avoided a possible artifact in Experiment I. *S*s performed the same task with either a limited number of card choices (limited KR) or an unlimited number of card choices (unlimited KR). Results showed no significant difference in concept attainment performance but a significant improvement in the efficiency of information utilization in the limited KR condition.

References

1. Ammons, R. B. Effects of knowledge of performance: A survey and tentative theoretical formulation. *J. Gen. Psychol.*, 1956, **54**, 279-299.
2. Archer, E. J. Some greco-latin analyses of variance designs for learning studies. *Psychol. Bull.*, 1952, **49**, 524-537.
3. Bilodeau, E. A., & Bilodeau, I. McD. Variable frequency of knowledge of results and the learning of a simple skill. *J. Exper. Psychol.*, 1958, **55**, 379-383.
4. Bilodeau, E. A., Bilodeau, I. McD., & Schumsky, D. A. Some effects of introducing and withdrawing knowledge of results early and late in practice. *J. Exper. Psychol.*, 1959, **58**, 142-144.
5. Bourne, L. E., & Pendleton, R. B. Concept identification as a function of completeness and probability of information feedback. *J. Exper. Psychol.*, 1958, **56**, 413-420.
6. Brown, B. R., Walker, D. W., & Evans, S. H. Schematic concept formation as a function of constraint redundancy and knowledge of results. *Psychon. Sci.*, 1968, **11**, 75-76.
7. Bruner, J. S., Goodenough, J. J., & Austin, G. A. A Study of Thinking. New York: John Wiley, 1956.
8. Cotterman, T. E. Effects of variations in specificity of knowledge of results on the improvement of a perceptual skill. *USAF WADC Tech. Rep., No.* 58-673, 1960.
9. Edmonds, E. M., Mueller, M. R., & Evans, S. H. Effects of knowledge of results on mixed schemata discrimination. *Psychon. Sci.*, 1966, **6**, 377-378.
10. Elwell, J. L., & Grindley, G. C. The effect of knowledge of results on learning and performance. I. A co-ordinated movement of the two hands. *Brit. J. Psychol.*, 1938, **29**, 39-53.

11. EWART, P. H., & LAMBERT, J. F. The effect of verbal instructions upon the formation of a concept. *J. Gen. Psychol.*, 1932, **7**, 400-412.

12. LINDQUIST, E. F. Design and Analysis of Experiments in Psychology and Education. Boston, Mass.: Houghton-Mifflin, 1953. Pp. 207-216.

13. LUCHINS, A. S. Mechanization in problem-solving: The effect of Einstellung. *Psychol. Monog.*, 1942, **54** (Whole No. 248).

14. MEADOW, A., PARNES, S. J., & REESE, H. Influence of brainstorming instructions and problem sequence on a creative problem-solving test. *J. Appl. Psychol.*, 1959, **43**, 413-416.

15. NAMIKAS, G. Concept identification as a function of relevance of pretraining and percentage of informative feedback. *Psychon. Sci.*, 1967, **8**, 261-262.

16. ROSS, C. C. The influence upon achievement of knowledge of results. *J. Educ. Psychol.*, 1933, **24**, 609-619.

17. SMITH, M. H., JR. Instructional sets and habit interference. *J. Exper. Psychol.*, 1952, **44**, 267-272.

18. WALKER, D., BROWN, B. R., & EVANS, S. H. Schema discrimination as a function of redundancy and knowledge of results. Paper presented at the Southwestern Psychological Association Convention, Houston, Texas, April 1967.

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A NOTE ON THE RELATIONSHIPS BETWEEN THE DRAW-A-MAN TEST, THE PROGRESSIVE MATRICES TEST, AND CONSERVATION*

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A. INTRODUCTION

The Goodenough Draw-a-Man Test has been described as a measure of intellectual and conceptual maturity. This involves the child's ability to perceive, to abstract, and to generalize (3, p. 5). Related to this, although no empirical evidence was offered, it has been suggested that the Draw-a-Man Test is closely linked with general cognitive development as described by Piaget (3, pp. 7, 191, 223).

Correlations of the Draw-a-Man Test with such measures of intelligence as the Stanford-Binet and the WISC are generally high (3, pp. 96-97). Conversely, Harris (2) found that for kindergarten children the correlation between the Progressive Matrices and Draw-a-Man tests was low ($r = .22$). This is surprising in that the Progressive Matrices Test, though not described as a measure of "general intelligence," purports to assess essentially the same thing as the Draw-a-Man: children's basic cognitive processes and mental development (5).

The purpose of this investigation was to ascertain (*a*) the relationship between the Draw-a-Man and the Raven Progressive Matrices tests with a sample reflecting greater age variation than used by Harris (2), and (*b*) the relative strengths of association between these two measures and cognitive development as assessed by conservation of mass and weight.

B. METHOD

1. *Subjects*

The *S*s were 221 children, grades kindergarten through three, selected from a racially mixed elementary school serving a middle socioeconomic class community. The ages of the children ranged from five years six months to nine years six months.

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2. *Procedure*

The Goodenough-Harris Drawing Test (3), the Raven Progressive Matrices Test (5), a two item conservation of mass test, and a two item conservation of weight test were individually administered to all *S*s.

The conservation tests were derived from Piaget's clinical method (1, 4). The conservation of mass items were as follows: (*a*) Two clay balls were placed on a table in front of the child who was asked if both balls had the same amount of clay. If *S* did not agree that they did, clay was added or taken away until agreement, which was obtained in all cases, of equality of the two balls was obtained. *E* then said: "Now I am going to roll this ball into a hot dog. Is there as much clay in the hot dog, or do they have different amounts of clay?" After *S* responded to this question he was asked: "Why is that, why do you say that?" (*b*) The second item on conservation of mass was the same as the first except that the ball to be transformed was divided into three smaller balls. The question *E* asked was: "Do these three balls taken all together have the same amount of clay as this ball (the standard)?" After *S* responded he was once again asked: "Why is that, why do you say that?"

The conservation of weight protocols were identical with the conservation of mass items except that rather than *E* asking about amount of clay, he asked about weight; e.g., "Do both the ball and the hot dog have the same amount of weight, or do they have different weights?" (Item *a*); and "Do these three balls taken all together weigh the same as this ball, or is the weight of the three balls together different from the weight of this ball?" (Item *b*). Both of these questions were followed by *E* asking: "Why is that, why do you say that?"

3. *Scoring*

The scoring procedures used were standard for the Draw-a-Man (3) and Progressive Matrices (5) tests. Reliability of scoring the Draw-a-Man was checked by having two individuals independently score the test.

The method of scoring the conservation of mass and weight tests was that in order to be considered to be correct on any item, *S* had to respond correctly to the question following the transformation, as well as be able to justify his response with an answer which reflected the logical necessity of the initial answer. For example, responses such as "It's the same, you just changed the shape," or "It's the same, you didn't add any or take any away," were considered correct. In order for *S* to be classified as a conserver of either mass or weight, he had to get both of the items of each task correct. If *S* got just one of the items correct he was categorized as transitional; for no items correct he was classified as a nonconserver.

C. RESULTS AND DISCUSSION

The intercorrelation between the Draw-a-Man and the Progressive Matrices tests was calculated to be .55 ($r^2 = .30$). This value departs significantly ($p < .05$) from zero. The ninety-five percent confidence interval for the true correlation is: $.49 \leqslant \rho \leqslant .64 = .95p$.

In order to determine the strengths of association between the Draw-a-Man Test, the Raven Progressive Matrices Test, and conservation of mass, the *S*s were divided into two groups: those who were classified as conservers of mass and those who were judged to be nonconservers. The same procedure was used for conservation of weight. The statistic eta (η), used to describe the strength of association between nominal and interval data, was calculated for both of the Piagetian tasks and the Draw-a-Man Progressive Matrices tests. All η values differed significantly ($p < .05$) from zero. Table 1 reports the results of this analysis.

TABLE 1
STRENGTHS OF ASSOCIATION BETWEEN THE DRAW-A-MAN AND PROGRESSIVE MATRICES TESTS AND CONSERVATION OF MASS AND WEIGHT

Tests	η	η^2
Draw-a-Man—Conservation of Mass	.368*	.136
Progressive Matrices—Conservation of Mass	.614*	.378
Draw-a-Man—Conservation of Weight	.353*	.125
Progressive Matrices—Conservation of Weight	.614*	.378

* departs significantly ($p < .05$) from zero.

Since the amount of variance shared between the Draw-a-Man and the Progressive Matrices tests is large ($r^2 = .30$), the data were further analyzed to determine the relative relationships between the Piagetian tasks and these two variables independent from one another. The results of this analysis revealed that the Draw-a-Man Test was not significantly ($p > .05$) related to either of the conservation measures; the Progressive Matrices Test was ($p < .05$), however. These results are summarized in Table 2.

The data from the present study indicate that the intercorrelation between the Draw-a-Man and Progressive Matrices tests is larger than what Harris (2) reports. The hypothesis that the Draw-a-Man Test is highly related to cognitive development as reflected by the Piagetian tasks of conservation of mass and weight was only partially supported. When the variance shared between the Draw-a-Man and the Progressive Matrices tests was removed, the former failed to be significantly associated with either of the Piagetian tasks used. Beyond this, the Progressive Matrices Test was shown to be consistently and significantly related to conservation mass and weight.

TABLE 2
STRENGTHS OF ASSOCIATION BETWEEN THE DRAW-A-MAN TEST AND CONSERVATION, WITH THE PROGRESSIVE MATRICES HELD CONSTANT, AND THE PROGRESSIVE MATRICES TEST AND CONSERVATION WITH THE DRAW-A-MAN HELD CONSTANT

Test	η	η^2
Draw-a-Man—Conservation of Mass (Progressive Matrices Held Constant)	.001	.000
Progressive Matrices Conservation of Mass (Draw-a-Man Held Constant)	.329*	.108
Draw-a-Man—Conservation of Weight (Progressive Matrices Held Constant)	.000	.000
Progressive Matrices—Conservation of Weight (Draw-a-Man Held Constant)	.326*	.106

* departs significantly ($p < .05$) from zero.

D. SUMMARY

Draw-a-Man, Progressive Matrices, and conservation of mass and weight tests were individually administered to 221 children whose ages ranged from five years six months to nine years six months. The interrelationships between the Draw-a-Man and Progressive Matrices test and conservation of mass and weight were assessed. The results indicate that although the Draw-a-Man and Progressive Matrices tests are highly correlated, they are differentially related to conservation. The Progressive Matrices Test was found to be significantly associated with conservation after the variance shared with the Draw-a-Man Test was removed. The Draw-a-Man Test, on the other hand, failed to be significantly related to conservation after this variance was removed.

REFERENCES

1. ELKIND, D. Children's discovery of conservation of mass, weight, and volume: Piaget replication study II. *J. Gen. Psychol.*, 1961, **98**, 219-227.
2. HARRIS, D. B. A note on some ability correlates of the Raven Progressive Matrices in the kindergarten. *J. Educ. Psychol.*, 1959, **50**, 228-229.
3. ———. Children's Drawings as Measures of Intellectual Maturity. New York: Harcourt, Brace, & World, 1963.

4. PIAGET, J. The Child's Conception of Number. London, England: Routledge & Kegan Paul, 1952.
5. RAVEN, J. C. Guide to Using the Coloured Progressive Matrices. Dumfries, Scotland: Grieve, 1965.

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THE EFFECTS OF MARLOWE-CROWNE AND INSTRUCTIONAL SOCIAL DESIRABILITY SETS ON THE SELF-CONCEPT SCALE*

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One of the earliest and still most commonly employed instruments for measuring self-concept has been the Butler-Haigh Q-sort used in the Rogers and Dymond (3) study to measure change in self-concept as a result of counseling. Self-concept tests have been attacked as being greatly influenced by such relatively superficial factors as conscious and unconscious response sets, culturally determined stereotypes, and social desirability. The latter variable —social desirability—seems to be a particular problem for self-concept tests one of whose major assumptions are that self-reports are valid indices and are highly dependent on visible content validity (2). Block and Thomas (1) have postulated a curvilinear relationship between scores on self-concept indices and actual level of adjustment, hypothesizing that those who score very high on self-concept measures are actually being defensive and using the socially desirable response set.

The present study was conducted with the use of scores on the Marlowe-Crowne Social Desirability Scale (*M-C SDS*) to differentiate high and low social desirability groups and compare their scores on the Self-Concept Scale (a derivative of the Butler-Haigh Q-sort put into a standard questionnaire form by Dymond, 1966)[1] taken under three experimenter-determined response conditions: (*a*) anonymously (as if the name weren't on it), (*b*) standard procedure (honestly and putting name on it), (*c*) in a socially desirable manner (fake good so as to appear extremely well-adjusted). The *S*s were told they could mark the questions in any order they wanted to. The *S*s were female volunteers from an introductory psychology class at Southern Illinois University. The *S*s were divided into two groups of 20 on the basis of their *M-C SDS* scores. The mean of the high social desirability group was 20.17 with a standard deviation of 2.67, and the mean of the low social desirability group was 7.25 with a standard deviation of 2.68. The results on

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[1] R. F. Dymond, personal communication, University of Chicago, 1966.

the Self-Concept scores under the three response conditions were analyzed with the use of a two-factor analysis of variance technique, with supplemental Tukey "a" tests. Only the interaction term attained statistical significance; the high social desirability group scored higher under both the anonymous response condition and the standard response condition, and there was no difference under the socially desirable response condition. Thus, although both groups were equally able to "fake good" on the Self-Concept Scale, there were substantial differences between the groups under anonymous and standard conditions. There are two major possible interpretations of these results: (*a*) that under standard testing instructions those *S*s who are motivated to respond in a culturally appropriate and acceptable manner consciously or unconsciously biased their test scores in this direction and thus the Self-Concept score was biased at least to some extent by the socially desirable response set or (*b*) that those who scored higher on the Self-Concept scale were in fact better adjusted, and this is also reflected by their higher Marlowe-Crowne scores.

REFERENCES

1. BLOCK, J., & THOMAS, H. Is satisfaction with self a measure of adjustment? *J. Abn. & Soc. Psychol.*, 1955, **51**, 254-259.
2. CROWNE, D. P., & STEPHENS, M. W. Self-acceptance and self-evaluative behavior: A critique of methodology. *Psychol. Bull.*, 1961, **58**, 104-121.
3. ROGERS, C. R., & DYMOND, R. F. Psychotherapy and Personality Change. Chicago, Ill.: Univ. Chicago Press, 1954.

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A COMPARISON OF MALE AND FEMALE PATIENTS AT AN ALCOHOLISM TREATMENT CENTER*

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A. INTRODUCTION

A number of writers who have described sex differences among alcoholics have observed that women alcoholics demonstrate a higher incidence of serious pathology than do their male counterparts (4, 6, 8, 9, 10). They comment that alcoholism is more individualized, more directly related to specific life situations, in women than in men (10, 11), and that more alcoholic women than men report alcoholism in their parents or siblings (10). Once excessive drinking begins to be a problem for a woman, the course of the illness has been described as severe and rapid; symptoms tend to be telescoped (5, 9). [For a review of the literature on women alcoholics see (1, 2).]

These varied efforts to describe some aspects of alcoholism as it affects women have been rather fragmented. Each has dealt with a different population, with little effort to determine whether the observed factors would be found in other female alcoholics as well or are specific to that particular group. The question of generalizability is further complicated by the fact that most of the studies deal with subjects from state hospitals or correctional institutions, and primarily with samples drawn from the lower and lower-middle socioeconomic classes. There is a clear need for an attempt to apply as many of these observations as possible to other populations in an effort to determine whether these authors were tapping genuine sex differences in alcoholism or whether they were describing specific findings limited to their particular populations.

B. METHOD

The differences which had been described between male and female alcoholics were tested in a comparison of male and female patients at Hazelden, an alcoholism treatment center in Center City, Minnesota. Each sample con-

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[1] Formerly staff psychologist, Hazelden Foundation. Many members of the Hazelden Foundation staff were helpful in this study, and I am grateful to them for their invaluable assistance.

sisted of 100 consecutive admissions to one of Hazelden's living units, one for men and one for women. No matching or other selection was used, on the assumption that whatever differences occurred between the groups would constitute part of the data for the comparison. Although a wide range of socioeconomic levels was represented, most of the patients were from the middle, or upper-middle class. The age range for the men was from 19 to 68, with a mean of 47.72; for the women, the range was from 17 to 71, with a mean of 46.75. Only 17 of the men and 14 of the women had less than a high school education, while 62 of the men and 63 of the women had some education beyond the high school level. The groups were compared on the basis of social history, acquired from both the patient and, in most cases, from a member of the family; the Minnesota Multiphasic Personality Inventory (MMPI); the Shipley-Institute of Living Scale; a Sentence Completion test; and a questionnaire which each patient completed at the time of his discharge.

C. RESULTS

The contention that women alcoholics demonstrate a higher degree of serious pathology than do the male alcoholics was examined primarily on the basis of the results of the tests used and the patients' treatment histories.

On the MMPI, the two groups showed quite similar mean profiles (see Table 1). Both groups have Scales 2 (D) and 4 (Pd) as their high points, and both show some elevation on Scale 7 (Pt). This result is consistent with the findings of Gilberstadt and Duker (3) who described 2-7-4 as a frequent MMPI code type among alcoholics. Some differences appeared when individual scales were considered. Thirty-two women and only 19 men had *T* scores above 70 on Scale 3 (Hy). Since hysteria has traditionally been considered more common among women, this finding is perhaps not surprising. It might also suggest that the alcoholic woman uses the mechanisms of repression and denial more often than the alcoholic man does; perhaps social disapproval makes this a necessary line of defense. On Scale 4, the Psychopathic Deviate scale, 51 women had *T* scores above 70, while only 38 men had such elevated scores on this scale. This perhaps fits the hypothesis that alcoholic women are more deviant than alcoholic men, at least in terms of deviating from social expectations. This judgment should be tempered, however, by remembering, as Hewitt (4) pointed out in the early days of the MMPI, that this scale reflects a certain amount of general unhappiness, and might well be indicating the disruption resulting from alcoholism, rather than an underlying tendency to sociopathy. On Scale 9 (Ma), 27 men and 12 women scored over *T* score 70, suggesting that the male who becomes an alcoholic may well be energetic,

TABLE 1
MEAN MMPI PROFILES

Subjects	L	F	K	1 Hs	2 D	3 Hy	4 Pd	5 Mf	6 Pa	7 Pt	8 Sc	9 Ma	0 Si
Male	46	60	53	57	68	62	67	61	62	66	61	60	51
Female	50	60	53	56	69	63	69	45	62	65	63	58	56

Note: T scores, with K.

impulsive, and full of drive, while the woman is less likely to show these traits. The low T scores on Scale 5 (Mf) which were found on the women's profiles suggest that these women are more likely to be characterized by passivity and dependence than by high drive level or impulsivity.

Both samples have about the same number of "normal" profiles (i.e., no scale over T score 70) : 26 men and 27 women. The groups were also about equally divided in numbers of persons having only one or two scales above T score 70: 39 men and 30 women. The two groups showed few distinctions when two-point codes were considered, without consideration of elevation. Scale 7 (Pt) was one of the high points for 30 of the men and only 19 of the women. This suggests that the men were experiencing their anxiety more openly, rather than using the hysteroid defenses of denial and repression, expressed in the large number of high Scale 3 (Hy) scores among the women. The presence of Scale 2 (D) as one of the two high points for 43 of the men and 49 of the women suggests that the patients' characteristic defenses were not, at the time of the testing, serving to prevent their lapsing into depression. There was no pattern in the profiles which would suggest that more of one group than of the other had "psychotic" profiles.

A consideration of the treatment history of the two groups (see Table 2) gives some indication, perhaps, of why women alcoholics have been considered "sicker." Not only have more women been admitted as psychiatric patients; they have been admitted more often and for longer periods. Ten of the 15 men who had been hospitalized stated that it was for less than one month,

TABLE 2
TREATMENT HISTORY

Type of treatment	Males	Females
Psychiatric hospitalization	15	43
Psychiatric outpatient treatment	11	30
Extended outpatient treatment	6	19
Convulsive therapy (ECT, Insulin, Indoklon)	1	11
Detoxification hospitalization	30	41
Alcoholism treatment center or unit	23	19

while only 12 of the 43 women were hospitalized for such a brief period. Only three of the men, but 21 of the women, had more than one psychiatric hospitalization. This figure included six women who had been hospitalized more than five times. The women also utilized outpatient treatment more extensively than did the men. Nineteen of the 30 women who reported outpatient psychiatric treatment were treated over a period of several months or, if seen only briefly, were treated on several occasions by the same therapist; only six of the 11 men who reported outpatient treatment were seen over such an extended period. The remaining patients who reported some outpatient treatment described their treatment as involving only "three or four sessions," or an evaluation.

From their descriptions of their psychiatric hospitalizations, it seems clear that many of the women were complaining primarily of depression, and 11 were, at some time, treated with some sort of convulsive therapy, while only one of the men had received such treatment. The proportion of women given convulsive treatment cannot be explained in terms of the frequent use of this therapy for involutional depression; of the 11 so treated, only two were clearly in the menopausal age range at the time they received convulsive therapy. Two others may have entered this period: they were 45 and 49. The other seven, however, were clearly premenopausal. The two groups differed sharply in the incidence of suicide attempts. In the male group, one man was reported to have threatened suicide, but none had actually attempted it. In the female group, 11 had made attempts, and several had tried more than once. While a number of interpretations of this difference might be made, the greater rate of suicide attempts among the women patients is consistent with the tendency to see them as more seriously disturbed than the men.

Both groups had a few persons who were "chronic" patients, in the sense of having been in and out of treatment repeatedly. By almost any standard of chronicity, in terms of repeated treatment, more women would be included in this group. Only three men in this study had such extensive treatment records as about a dozen of the women.

The marital status of the patients might be considered as an index to the seriousness of the pathology, since it gives some hint of social stability. Sixty-nine of the men in this study were living with their first wives, while seven others were separated, but expected to return to their wives after treatment. Fifty-four of the women were still living with their first husbands, and of the six who were separated, none expressed a belief that the marriage would be restored. Only 14 of the men had been divorced, a surprisingly low rate in the light of the frequent association of alcoholism and divorce. Twenty of the women had been divorced.

As a further test of whether the pathology was more serious for the women than for the men, the scores for the two groups on the Shipley-Institute of Living Scale were compared, on the hypothesis that there might be a difference in intellectual functioning which would reflect cerebral impairment or functional inefficiency. The two groups proved to be quite similar, however. The mean Vocabulary score for the men was 30.48 and for the women, 32.05. The mean Abstractions score for the men was 20.90, while for the women it was 23.50. Both groups showed quite similar distributions, with Vocabulary scores heavily weighted toward the superior end of the distribution.

Whether or not the women in this group showed more serious pathology than the men, they did show a different pattern of illness. The relationship of alcoholism to some particular life situation was much more marked for the women. It was possible to identify some definite precipitating stress in 26 of the women's cases, while only eight of the men associated their alcoholism with some specific circumstance. In most cases, the woman had been drinking prior to the "trauma," but the particular event or situation seems to have tipped the scale toward uncontrolled, clearly alcoholic, drinking. For 21 of these women, the problem was related to some type of middle-age identity crisis: death of a husband, divorce, menopause, marriage of children, or other disruption of the role of wife and mother. Three of the women traced the beginning of drinking problems to depression following childbirth. Two women had a problem which is more often associated with men: both single and successful in their work, they were worried by approaching retirement. Of the eight men who associated their drinking problems with a definite situation, six reported that their drinking became excessive when they retired, completely or partially. Another related his drinking to the discovery of a serious health problem which would interrupt his career. The other was a man of 33 who was reported by his family to have begun drinking heavily after the death of his mother. In general, this sample supports the statement that alcoholism among women is more often associated with some specific life problem than is the case among men.

The findings for this group were inconclusive in regard to the hypothesis that more female than male alcoholics had alcoholic parents or siblings. Twenty-five of the women reported that their fathers were alcoholics, while 16 of the men reported alcoholic fathers. Four of the women and three of the men reported alcoholic mothers, while more than twice as many women as men reported that their mothers had been mentally ill (13-6). Twice as many women reported mentally ill fathers (4-2). A total of 43 women and 26 men reported some type of disruption in their early family life, either through alcoholism of a parent, mental illness of a parent, or absence of a parent through death, divorce or separation. With the use of the test for significance of the difference between two percentages suggested by Lawsheck and Baker (7), the difference between the 43 percent of the women and 26 percent of the men who had disrupted early lives is significant at the .01 level.

The observation that more female than male alcoholics had alcoholic siblings was not confirmed by this study. Sixteen of the men reported alcoholic siblings, and only 11 of the women.

The question of whether alcoholism progresses more quickly in women, moving more rapidly into severe stages, was not clearly answered in either direction. There was more discrepancy between the reports of the women alcoholics and their relatives than there was between the male alcoholics and their relatives. More of the women tended to minimize the period in which they had been drinking heavily. In other cases, the women reported that they had been drinking heavily and the relatives did not know it; they reported, in some cases, much longer periods of excessive drinking than the relative reported. For one group, however, the rapid progression did seem clearly observable: all of the women who began drinking as a reaction to a middle-age identity crisis moved from early alcoholism to late-stage symptoms in short periods of time, sometimes only a year or two.

Another difference in the pattern of alcoholism between the sexes proved to be in their use of medications. The abuse of tranquilizing medications and sedatives has become, in recent years, an important factor among alcoholics, with many alcoholics tending to develop dual or substitute dependencies. In this study, more women than men had used tranquilizers and sedatives, and more had problems with them. Although a large variety of medications had been taken by these patients, closest attention was given to the minor tranquilizers and sedatives, since these classes of drugs have seemed to present the greatest danger of habituation or dependency. Forty-three of the women and 20 of the men reported some use of these drugs. Twenty-five of the women and 10 of the men were considered by themselves, their own physicians, their families, or Hazelden staff to have problems in the use of these medications, usually in the form of exceeding recommended dosages, being unable to decrease the dosage, or feeling dependent upon the medications. One of the women had only a medication problem. Three others had previously been dependent upon alcohol, but had switched entirely to "pills" by the time of this admission. But most frequent, for both men and women, was the use of both alcohol and medication, with the attendant grave risks of accidental overdosage.

D. DISCUSSION

In general, this comparison of two groups of alcoholics would tend to support the conclusion that the pathology of alcoholism is different for men and women, and that these differences are important enough to require consideration in treatment planning. The women appear to have been considered psychologically "sicker," as judged by the amount of treatment they have received, but this conclusion must be tempered by the differences in social attitudes toward alcoholism in men and in women. There are two possible interpretations of the greater amount of psychiatric treatment received by the women: it is possible that alcoholic women really show more psychiatric symptomatology than their male counterparts, and these symptoms are serious enough to get them into treatment. But it is also possible that they are not really more disturbed than the men, but that society, at least in their class, finds it easier to recognize a woman as mentally ill than as an alcoholic. From the material in this study, it is not possible to determine definitely which conclusion is justified. It seems likely, however, that the true picture will somehow represent an interaction of these two factors. The alcoholic women may really be somewhat more psychologically deviant, but society is so much less willing to accept alcoholism in a woman than in a man that this greater deviancy is magnified. Although statistics alone cannot show it, it seems likely that a successful, middle-class husband would find it easier and more "enlightened" to decide that his wife is mentally ill and insist that she go into a hospital than to decide that she is an "inebriate" and send her into treatment specifically for alcoholism.

The MMPI revealed fewer differences between the groups than might be expected. Zelen, Fox, Gould, and Olson (12) have suggested that the development of the pathology contingent upon alcoholism tends to blur predictable sex differences in the MMPI. Whatever the explanation, the two groups in this study produced quite similar test patterns, whether considered in terms of mean profiles, two-point codes, or numbers showing elevation on each scale. Nothing in the MMPI patterns would provide evidence that women alcoholics are psychologically sicker than men.

Differences in the pattern and progression of alcoholism are less clear-cut than might have been expected from previous studies, but do tend, in general, to support the idea that once drinking gets out of control for a woman, the development of the illness is faster. Differences which were demonstrated included a greater tendency for alcoholism in women to be related to a specific life situation and a greater predilection among the women to abuse tranquilizers and sedatives.

Although some differences between the two groups appeared, the clearest finding of the study was the diversity within the groups. More study in depth of individual cases would be needed before explanatory force could be attributed to any factor in the patients' histories or personalities.

E. SUMMARY

In an attempt to test observations made by other authors of sex-differences in alcoholism, a comparison was made of 100 male and 100 female patients in an alcoholism treatment center. This comparison was based chiefly on the results of tests given the patients and on their social and treatment histories. The two groups showed quite similar MMPI patterns, both on the basis of mean profiles and two-point codes. The women, however, had received more psychiatric treatment than the men, had made more suicide attempts, and had experienced more marital disruption. Alcoholism for the women was more often related to specific life situations than was the case for the men, and they were more likely to have abused medications. The diversity within the groups was quite striking, however, and more study of individual cases would be needed before explanatory force could be attributed to any of the factors which emerged.

REFERENCES

1. CURLEE, J. Alcoholic women: Some considerations for further research. *Bull. Menninger Clinic,* 1967, **31**, 154-163.
2. ———. Women alcoholics. *Fed. Probation,* 1968, **32**, No. 1, 16-20.
3. GILBERSTADT, H., & DUKER, J. A Handbook for Clinical and Actuarial MMPI Interpretation. Philadelphia, Pa.: Saunders, 1965.
4. HEWITT, C. A personality study of alcohol addiction. *Quart. J. Stud. Alcohol,* 1943, **4**, 368-386.
5. HIRSH, J. Women and alcoholism. In W. C. Bier (Ed.), *Problems in Addiction.* New York: Fordham University, 1962. Pp. 108-115.
6. KARPMAN, B. The Alcoholic Woman. Washington, D.C.: Linacre, 1948.
7. LAWSHECK, C. H., & BAKER, P. C. Three aids in the evaluation of the significance of the difference between two percentages. *Educ. & Psychol. Meas.,* 1950, **10**, 263-270.
8. LISANSKY, E. Alcoholism in women: Social and psychological concomitants. *Quart. J. Stud. Alcohol,* 1957, **18**, 588-623.
9. ———. The woman alcoholic. *Annals Amer. Acad. Polit. & Soc. Sci.,* 1958, **315**, 73-81.
10. SHERFEY, M. Psychopathology and character structure in chronic alcoholism. In

O. Diethelm (Ed.), *Etiology of Chronic Alcoholism*. Springfield, Ill.: Charles C Thomas, 1955. Pp. 16-42.

11. WALL, J. A study of alcoholism in women. *Amer. J. Psychiat.*, 1966, **123**, 341-345.
12. ZELEN, S., FOX, J., GOULD, E., & OLSON, R. Sex-contingent differences between male and female alcoholics. *J. Clin. Psychol.*, 1966, **22**, 160-165.

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ROLE OF IMMEDIATE AND DELAYED KNOWLEDGE OF RESULTS IN PAIRED-ASSOCIATE LEARNING UNDER THE ANTICIPATION PROCEDURE*

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A. INTRODUCTION

Although it is well documented that performance in discrete-trials motor learning is not appreciably impaired by delayed knowledge of results (KR) (e.g., 5) it is less certain what effect delayed KR has upon performance in verbal learning. In most of the attempts to manipulate directly delay of KR in verbal learning the procedure has been to vary the time interval between stimulus presentation for testing and subsequent presentation of the KR. However, since delay of KR is confounded with such factors as the interitem intervals within a trial and total trial time, the hypothesis that delayed KR is less effective than immediate KR cannot be tested with the use of this procedure.

Jones and Bourne (8) have employed a paired-associate (PA) learning task in which the presentation of the stimulus terms for testing and S-R pairs for response confirmation and further learning occurred in such a way that the interval between the presentation of a particular stimulus term and the later presentation of the pair containing that stimulus could be varied systematically to provide delayed KR without confounding such factors as the interitem intervals within a trial and total trial time. Their immediate KR condition, designated as D-0, was the standard anticipation method of PA learning under which a trial consists of the presentation of the stimulus terms for testing with each followed immediately by that stimulus paired with its correct response for further learning (i.e., S_1, S_1-R_1, S_2, S_2-R_2, . . . S_n, S_n-R_n). Under their three delayed KR conditions, one, three, and seven items, respectively, were presented between each stimulus and the later presentation of the pair containing that stimulus. Hence, the item sequence within a trial for the eight pairs of the list was as follows under the three delayed KR conditions, designated as D-2, D-4, and D-8, respectively. Under D-2 the item sequence was S_1, S_2, S_1-R_1, S_2-R_2, . . . S_7, S_8, S_7-R_7, S_8-R_8. Under D-4

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the item sequence was S_1, S_2, S_3, S_4, S_1-R_1, S_2-R_2, S_3-R_3, S_4-R_4, S_5, . . . S_8-R_8. Under D-8 the item sequence was S_1, . . . S_8, S_1-R_1, . . . S_8-R_8, which comprised the recall method of PA learning under which a trial consists of the completely separate presentation of the S-R pairs for learning and stimulus terms for testing. Only under the condition where three items were presented between each stimulus and the later presentation of the S-R pair (i.e., D-4) was performance significantly impaired. However, the relatively small effects of delayed KR could well have resulted from the fact that the method used to provide increasingly delayed KR also shifted item presentation from the anticipation to the recall method. Many studies (e.g., 3, 6, 11, 12) have reported somewhat faster PA learning under the recall than under the anticipation method. Thus, the potentially detrimental effects of delayed KR could well have been offset by the potentially facilitative effects of transition from the anticipation to the recall method of presenting paired associates. Such a factor would account for the relatively small effects of delayed KR found by Jones and Bourne.

Consequently, the purpose of the present experiment was to determine whether the learning of paired associates occurs more rapidly under the usual form of the anticipation procedure, where KR is immediate, than under a form of the anticipation procedure where KR is delayed. The anticipation procedure was modified to provide delayed KR by separating systematically within each trial the presentation of the pairs for learning and response confirmation from presentation of the stimulus terms for testing in the manner

TABLE 1
ORDER OF ITEM PRESENTATION WITHIN A TRIAL UNDER EACH OF THE THREE DELAY CONDITIONS

D-0	D-2	D-4
S1	S1	S1
S1-R1	S8-R8	S7-R7
S2	S2	S2
S2-R2	S1-R1	S8-R8
S3	S3	S3
S3-R3	S2-R2	S1-R1
S4	S4	S4
S4-R4	S3-R3	S2-R2
S5	S5	S5
S5-R5	S4-R4	S3-R3
S6	S6	S6
S6-R6	S5-R5	S4-R4
S7	S7	S7
S7-R7	S6-R6	S5-R5
S8	S8	S8
S8-R8	S7-R7	S6-R6

outlined in Table 1. The immediate KR (D-0) condition represents the usual form of the anticipation procedure where KR is provided immediately following *S*'s response to each stimulus in the list. The delayed KR conditions (D-2 and D-4) represent variations in the anticipation procedure where two and four items, respectively, appeared between the presentation of each stimulus for testing and the later presentation of the pair containing that stimulus for response confirmation and further learning. This technique avoided confounding delay of KR with such factors as the interitem intervals within a trial, total trial time, and method of item presentation (i.e., anticipation *versus* recall).

B. METHOD

1. *Subjects*

The *S*s were 96 undergraduate males and females enrolled in introductory psychology classes at Virginia Polytechnic Institute for whom participation in the experiment fulfilled part of a course research requirement. None of the *S*s had previously participated in verbal learning experiments.

2. *Materials*

The two eight-pair PA lists employed in the experiment contained CVC trigrams as stimulus terms and two-digit numbers as response terms. Eight CVC trigrams of 90 percent association value according to Archer (1) were employed as stimulus terms in the list of high stimulus meaningfulness (M), and the stimulus terms in the list of low stimulus M were eight CVC trigrams of 10 percent association value. The manipulation of stimulus M at two widely varying levels was prompted by those studies (e.g., 7, 12) suggesting that the difference in rate of PA learning under various methods of item presentation is directly related to stimulus M. No two of the 16 trigrams employed in the two lists began nor ended with the same consonant, and the six vowels appeared within these trigrams with about equal frequency. Two sets of eight nonrepeating two-digit numbers of medium to high association value according to Battig and Spera (4) served as PA response terms and were found previously (12) to be of equivalent learning difficulty.

3. *Experimental Design*

The experiment consisted basically of a 3 × 2 factorial combination of the three delay conditions and two levels of stimulus M. Thirty-two *S*s learned both the high-M and the low-M list under one of the three delay conditions. Sixteen *S*s in each delay group learned the high-M followed by the low-M list, and the remaining 16 *S*s in each delay group learned the low-M followed by the high-M list. The *S*s were assigned to conditions in a randomly predetermined sequence in order of appearance for the experiment.

4. *Procedure*

a. PA learning. Upon entering the laboratory *S* was given instructions for PA learning which were worded in such a way so as to be applicable to PA learning under all three delay conditions. The instructions described the anticipation method of PA learning in general terms but made no reference to whether other list stimuli and pairs would or would not appear between the presentation of each stimulus term for testing and the subsequent presentation of that stimulus paired with its correct response.

During a trial each item was projected on a translucent screen by an automatically timed Kodak Carousel slide projector. PA learning was continuous under all conditions, with both the interitem intervals within a trial and the intertrial intervals .75 second in duration. Interitem and intertrial intervals of equivalent duration were employed in order to equate the time interval between stimulus presentation and pair presentation for all pairs in the list under a particular delay condition. Four different item orders were employed over trials in each delay condition in order to prevent serial learning. Trial-1 performance was made possible by presenting the eight pairs of the list, at a two-second rate with .75-second interitem intervals, immediately prior to the beginning of Trial 1. List 1 was learned to a criterion of one errorless trial, and following a three-minute rest period List 2 was learned to the same criterion. A response was scored as correct only if given aloud during the two-second period in which the stimulus for that response appeared on the screen.

b. R-S recall. After a three-minute rest period following the learning of List 2 *S* was given a single R-S recall trial in which the 16 response terms from the two PA lists were presented in random order for five seconds each, with .75-second interitem intervals. The *S* was instructed to spell aloud the CVC stimulus term which had been paired with each two-digit number as that number appeared on the screen, but no KR was given in R-S recall.

c. Stimulus recognition. Immediately following the single R-S recall trial *S* was given a stimulus-recognition test in the form of a matrix of 16 rows of six CVC trigrams each. One CVC in each row was a stimulus term from one of the two PA lists, and the remaining five CVCs in each row represented the following five modifications in the correct PA stimulus in that row: (*a*) the first consonant changed; (*b*) the second consonant changed; (*c*) the vowel changed; (*d*) the first consonant and vowel changed; and (*e*) the vowel and second consonant changed. The position of the rows containing a List-1 or List-2 stimulus term, as well as the order in which the six items appeared within each row, was randomized in the matrix. The *S* was told that each row of the matrix contained one of the PA stimuli he had encountered during learning, and he was instructed to identify that stimulus.

d. S-R matching. Immediately following stimulus recognition *S* was given an S-R matching test. The test sheet for S-R matching contained the 16 CVC stimulus terms listed in random order in the left-hand column and the 16 two-digit number response terms listed in random order in the right-hand column. The *S* was instructed to indicate which of the response terms listed in the right-hand column had been paired during learning with each of the stimulus terms listed in the left-hand column.

C. RESULTS

Presented in Table 2 are mean trials to criterion, mean errors occurring both before and after the first correct response to each stimulus in the list, and mean total errors in PA learning under each of the six conditions of stimulus M and delay of KR. Presented in Table 3 are mean correct responses in R-S recall, stimulus recognition, and S-R matching under each of these conditions. There were significantly fewer trials to criterion, before errors, after errors, and total errors in learning the PA list of high stimulus M than in learning the PA list of low stimulus M ($Fs \geqslant 6.52$, $df = 1/90$, $p < .025$). There were also significantly more correct responses in high stimulus-M than in low stimulus-M R-S recall, stimulus recognition, and S-R matching ($Fs \geqslant 32.74$, $df = 1/90$, $p < .001$). However, in none of the measures was there a difference in performance between the groups learning the two PA

TABLE 2
MEAN PERFORMANCE IN PA LEARNING

Performance measures	Stimulus M	D-0	D-2	D-4
Trials to Criterion	High M	4.81	6.94	6.78
	Low M	5.09	10.66	9.41
Before Errors	High M	9.94	16.69	16.75
	Low M	12.44	28.91	24.75
After Errors	High M	1.78	4.31	4.38
	Low M	2.28	7.03	7.59
Total Errors	High M	11.72	21.00	21.03
	Low M	14.72	35.94	32.34

lists in high-M—low-M and low-M—high-M sequence (Fs $\leqslant 2.33$, $df = 1/90$, $p > .10$).

The delay variable produced highly significant effects in all of the measures presented in Tables 2 and 3 (Fs $\geqslant 6.78$, $df = 2/90$, $p < .005$). There were significantly fewer trials to criterion, before errors, after errors, and total errors in PA learning under the D-0 condition than in PA learning under the D-2 and D-4 conditions (Fs $\geqslant 13.51$, $df = 1/90$, $p < .001$), but none of the difference in PA learning between the D-2 and D-4 conditions attained significance (Fs < 1.00). Performance in R-S recall, stimulus recognition, and S-R matching, on the other hand, was significantly better under the D-2 and D-4 conditions than under the D-0 condition (Fs $\geqslant 38.33$, $df = 1/90$, $p < .001$). Performance under the D-2 and D-4 conditions failed to differ in R-S recall and stimulus recognition (Fs < 1.00), but there were significantly more correct responses in S-R matching under the D-4 condition than under the D-2 condition ($F = 4.25$, $df = 1/90$, $p < .05$).

TABLE 3

MEAN PERFORMANCE IN R-S RECALL, STIMULUS RECOGNITION, AND S-R MATCHING

Performance measures	Stimulus M	D-0	D-2	D-4
Correct R-S Recall	High M	2.69	4.53	4.78
	Low M	.91	2.22	2.22
Correct stimulus Recognition	High M	6.31	7.22	7.53
	Low M	4.19	6.66	6.59
Correct S-R Matching	High M	5.44	7.12	7.38
	Low M	3.88	6.25	7.19

The Delay × Stimulus M interaction attained significance in trials to criterion, before errors, and total errors in PA learning (Fs $\geqslant 3.52$, $df = 2/90$, $p < .05$). The form of this interaction was the same in all three of these measures; the difference between D-0 and D-2—D-4 performance was significantly greater in learning the PA list of low stimulus M than in learning the PA list of high stimulus M (Fs $\geqslant 5.72$, $df = 1/90$, $p < .025$). Although of the same general form, the Delay × Stimulus M interaction failed to attain significance in PA after errors ($F < 1.00$). The Delay × Stimulus M interaction also attained significance in stimulus recognition and S-R matching (Fs $\geqslant 6.64$, $df = 2/90$, $p < .005$), but failed to attain significance in R-S recall ($F < 1.00$). The differences between D-0 and D-2—D-4 performance in low stimulus-M recognition and S-R matching were significantly greater than the differences between D-0 and D-2—D-4 performance in high stimulus-M recognition and S-R matching ($Fs \geqslant 9.73$, $df = 1/90$, $p < .005$).

D. DISCUSSION

It is apparent from inspection of Table 2 that the appearance of other stimuli and pairs in the list between the presentation of each stimulus term for testing and the subsequent presentation of that stimulus paired with its correct response markedly impaired performance in PA learning. The superiority of D-0 over D-2—D-4 performance in PA learning is consistent with the notion that immediate KR facilitates the learning of paired associates presented by the anticipation method. The failure to find D-2 performance superior to D-4 performance in any measure of PA learning suggests that increases in delay of KR beyond a certain point produce no further impairment in PA performance.

The presentation of the S-R pair during a PA trial can be conceptualized as serving two basic functions, both of which are hypothesized to produce improvements in performance over successive PA trials. One function is to provide the basis for the occurrence of further learning. Presentation of the stimulus paired with its correct response is the generally accepted procedure for strengthening the associative connection between stimulus and response in PA learning. The learning increments resulting from S-R pair presentation during a PA trial should have been essentially the same under the three delay conditions, since each S-R pair appeared once during each trial under each of these conditions. The second function of S-R pair presentation can be thought of as a KR response-confirmation function which serves to indicate to *S* the correctness or incorrectness of his responses. In this respect the three delay conditions were vastly different. The presentation of the S-R pair immediately following presentation of the stimulus term for testing permitted immediate response confirmation under D-0. It is likely that the S-R pair served little or no response-confirmation function under the D-2 and D-4 conditions because of the items of the list which appeared between stimulus presentation for testing and subsequent S-R pair presentation under these conditions.

The present findings suggest that short-term memory (STM) may be the principal factor underlying the response-confirmation function of S-R pair presentation. Such a conclusion is supported by the superiority of D-0 over D-2—D-4 performance in PA learning and by the failure to find performance differences in PA learning between D-2 and D-4. The rationale for proposing STM as a major determinant of the KR function of S-R pair presentation is as follows. Under D-0 the interval between stimulus presentation for testing and subsequent KR in the form of S-R pair presentation was only .75 second, and, as a result, *S* could easily have used STM to retain test trial events, such as the PA test stimulus and response made to that stimulus, until the subsequent occurrence of the KR provided by S-R pair presentation. On the other hand, *S* could not rely upon STM for retention of the test trial events over the test-KR interval under the D-2 and D-4 conditions, since the test-stimulus—S-R-pair intervals were much longer (6.25 seconds and 11.75 seconds, respectively) under these conditions. Many studies (e.g., 9, 10) have shown that the probability of short-term verbal recall is extremely high following a retention interval of .75 second, but low following retention intervals of 6.25 and 11.75 seconds. Furthermore, since each PA trial consisted of the presentation of eight test stimuli and eight S-R pairs, there was considerable opportunity for both proactive and retroactive inhibition of within-trial STM. Such a factor would reduce even further the possibility of retaining the test trial events in STM over the test-stimulus—S-R-pair intervals under D-2 and D-4.

The final question to be considered concerns the mechanism(s) underlying the facilitation of performance in PA learning by effective KR. Although evidence on this point is indirect, a strong case can be made that the principal way in which effective KR aids PA learning is by minimizing intratask interference [for a discussion of intratask interference in PA learning see Battig (2)]. Without effective KR *S* might well be forced to employ some other perhaps less efficient technique for reducing or minimizing interference present during PA learning. One possible way in which high levels of interference might be reduced is through *overlearning*. There is evidence that considerable overlearning occurred under the D-2 and D-4 conditions. It is evident from the superiority of D-2—D-4 performance in R-S recall, stimulus recognition, and S-R matching (Table 3) that *S* had learned (or overlearned) the individual list items better and formed stronger associations under D-2 and D-4 than under D-0. These additional learning requirements may well explain the considerably greater difficulty of PA learning under the D-2 and D-4 conditions than under the D-0 condition.

E. SUMMARY

Ninety-six *S*s learned by the anticipation method two eight-pair PA lists, one of high stimulus M and the other of low stimulus M, under one of three conditions of delay of KR produced by separating systematically within each trial the presentation of the S-R pairs for learning and response confirmation

from presentation of the stimulus terms for testing. PA learning occurred more rapidly under the immediate KR condition than under the two delayed KR conditions, which failed to differ, but performance in R-S recall, stimulus recognition, and S-R matching was better following PA learning under delayed KR than following PA learning under immediate KR. The results suggested that STM is a basic factor underlying the KR response-confirmation function of S-R pair presentation. It was proposed that immediate KR represents an effective way of minimizing or reducing interference in PA learning. In the absence of immediate KR *S* may well be forced to overlearn the various elements of the list in order to overcome the detrimental effects of interference.

REFERENCES

1. ARCHER, E. J. A re-evaluation of the meaningfulness of all possible CVC trigrams. *Psychol. Monog.*, 1960, **74**(10), Whole No. 497.
2. BATTIG, W. F. Paired associate learning. In T. R. Dixon and D. L. Horton (Eds.), *Verbal Behavior and General Behavior Theory*. Englewood Cliffs, N.J.: Prentice-Hall, 1968.
3. BATTIG, W. F., & BRACKETT, H. R. Comparison of anticipation and recall methods in paired-associate learning. *Psychol. Rep.*, 1961, **9**, 59-65.
4. BATTIG, W. F., & SPERA, A. J. Rated association values of numbers from 0-100. *J. Verbal Learn. & Verbal Behav.*, 1962, **1**, 200-202.
5. BILODEAU, E. A., & BILODEAU, I. McD. Variation of temporal intervals among critical events in five studies of knowledge of results. *J. Exper. Psychol.*, 1958, **55**, 603-612.
6. COFER, C. N., DIAMOND, F., OLSEN, R. A., STEIN, J. S., & WALKER, H. Comparison of anticipation and recall methods in paired-associate learning. *J. Exper. Psychol.*, 1967, **75**, 545-558.
7. ELMES, D. G., & LOVELACE, E. A. Meaningfulness and presentation method in paired-associate learning. *J. Verbal Learn. & Verbal Behav.*, 1967, **6**, 296-298.
8. JONES, R. E., JR., & BOURNE, L. E., JR. Delay of informative feedback in verbal learning. *Canad. J. Psychol.*, 1964, **18**, 266-280.
9. MURDOCK, B. B., JR. The retention of individual items. *J. Exper. Psychol.*, 1961, **62**, 618-625.
10. PETERSON, L. R., & PETERSON, M. J. Short-term retention of individual verbal items. *J. Exper. Psychol.*, 1959, **58**, 193-198.
11. REYNOLDS, J. H. Effects of nonanticipation and anticipation procedures upon paired-associate learning in unmixed and mixed lists. *Psychol. Rep.*, 1964, **15**, 795-801.
12. WRIGHT, J. H. Effects of stimulus meaningfulness, method of presentation, and list design on the learning of paired associates. *J. Exper. Psychol.*, 1967, **73**, 72-77.

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RELATIONSHIP BETWEEN STIMULUS CLASS AND RESPONSE CLASS IN QUANTITY AND COMMUNALITY OF ASSOCIATIONS*[1]

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A. INTRODUCTION

The theoretical and empirical attempts to examine the relationship between language and thought have been briefly summarized by Anderson (1). He pointed out that, among other factors needing investigation, the results from the free-association procedures (commonly used to analyze thought processes) were such as to confound *S*'s preferences for certain word classes with his ability to use those word classes.

In his own study designed to examine this problem, Anderson reported that stimulus words which could be used either as nouns or as adjectives elicited greater associative output when *S* was required to give noun responses as opposed to being required to produce adjective responses. He interpreted this result to mean that in the production of ideas, *S*s had less ability to deal with adjectives than with nouns.

Careful examination of Anderson's procedure, however, indicated several confounding factors. First, his stimuli, although usable as either nouns or adjectives, were words which are most commonly used as nouns. [A dictionary check (9) of first-listings verified this observation.] Secondly, Anderson's output score consisted of total number of blank spaces in his frame which *S* completed in a fixed time. Because the structure of the frames was not completely constraining, scores could have included responses from other than the stipulated noun or adjective categories. Thirdly, output alone may be a confounded measure of "ease (or commonality) of association." The production of many banal ideas is a quite different response-pattern from the production of many unique ideas. And finally, both the small number of *Ss* and certain limitations of the experimental design employed left the results highly limited in terms of generalization.

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[1] Based upon a paper presented at the 39th Meeting of the Eastern Psychological Association, Washington, D.C., April, 1968.

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The present study was designed to examine the questions raised by Anderson, but by taking the above factors into account.

B. Method and Procedure

Forty *S*s from elementary psychology classes were randomly assigned to one of four conditions of a 2×2 factorial design. Independent variables were primary language structure usage of stimulus class (noun and adjective) and required mode-of-response class (noun and adjective). Dependent measures were total number of stipulated type of associations (output scores) and commonality-of-response scores [mean weighted Thorndike-Lorge (7) ranking]. Thus "ease" of generation of response could be examined on two dimensions.

*S*s were tested in three groups ranging in size from five to 20 persons. Each *S* was given a booklet from the top of a pile previously arranged in random order. All *S*s received the same oral introduction to the effect that the study was one on the relationship of language and thought, that their participation would be a big help both to *E* and to the department, that the procedure required only about five minutes total time, and that a complete explanation would be given when it was over.

Four types of booklets (paralleling the four conditions of the experimental design) had been prepared. One half of the booklets contained four words which were usable as either nouns or adjectives, but whose *primary* usage [as determined by first dictionary listing (9) and unanimous agreement of an independent panel of judges] was as nouns. These words were: curiosity, buildings, love, and clothing. The other half of the booklets contained four similar words, but ones which had primary usage (by the same criteria) as adjectives. These were: personality, texture, (sizes and shapes of) people, and weather. The four stimulus words of one type, together with instructions and one illustration of the desired type of response, were typed one to a page with spaces for *S* to fill in his responses designated by blank lines. Within stimulus-type, page sequences were systematically counterbalanced.

Because Weaver and Madden (8) had shown that the form of verbal wording of the instructions could significantly affect results, instructions for all words—regardless of designated response category—were made as identical as possible.[3] Differences in the frame and illustration were relied upon to establish a set for the desired type of response. (In this respect, the procedure was identical to Anderson's.)

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[3] In some cases a substitute for the word "kinds" was made in the instructions to insure better grammatical sense. Thus, different "types" of love, buildings, clothing, personality, and weather; different "kinds" of texture; and different "sizes and shapes" of people were called for.

For example, in the booklets using the noun-stimulus "curiosity," all instructions read: "One can be curious about many things. In one minute, list as many kinds of curiosity as you can think of." In booklets designed to elicit noun responses, these instructions were followed by the following type of frame and example:

curiosity about SCIENCE
curiosity about ________

Booklets designed to elicit adjective associations contained the following frame type:

SCIENTIFIC curiosity
________ curiosity

The constraints of these frames (in the context of the common instructions) were not adequate to completely eliminate responses of a nondesignated type; e.g., adverbs, pronouns, etc. Therefore, only those responses which actually belonged to the designated response-class were counted in the output scores.[4]

Separate commonality-of-association scores were also obtained for each *S*. First, all responses of all *S*s to all stimuli were arranged in rank order according to Thorndike-Lorge (7) rating. The least frequent associations were ranked one and the highest rank was given the AA category. The ranks for the individual responses for each *S* were then added and divided by the number of his responses to obtain his mean commonality score.

C. RESULTS

The two types of scores—quantity of output and mean commonality-of-association—were examined independently by analysis of variance and also each with the covariance of the other removed.

As can be seen in Table 1, the two types of scores appeared to yield different response patterns. This difference was confirmed by the analyses of variance. The F-ratios for output scores showed significant main effects for stimulus class ($F = 4.51$, $p < .05$) and for response type ($F = 6.47$, $p < .025$, 1 and 36 df for each). There was no significant interaction.

Commonality scores, however, not only yielded statistically significant main effects for stimulus and response type ($F = 18.81$, $p < .001$ and 7.83, $p < .01$ respectively), but also a statistically significant interaction ($F = 31.75$, $p < .001$, df 1 and 36 in all cases). The two types of scores also appeared to

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[4] In actuality, there were very few discarded responses. These were scattered across all stimuli in all groups with no systematic patterns present.

TABLE 1
MEAN OUTPUT AND ASSOCIATION VALUE SCORES ($N = 40$)
(High scores = high output and high commonality)

Response class	Output scores Stimulus class			Association-Commonality scores Stimulus class		
	Noun	Adj.	Total	Noun	Adj.	Total
Noun	32.1	36.0	34.05	165.14	104.98	135.06
Adj.	23.5	31.0	27.25	114.26	122.09	118.18
Total	27.8	33.5		139.70	113.54	

be relatively independent of each other. Removing the covariance of one from the other left the basic relationships in the original analyses unchanged.

The absence of any significant interaction with the output score indicated that customary stimulus usage and designated response class functioned in relatively independent fashion. When noun-responses were required, the total output was greater regardless of primary usage class of the stimulus. This difference, significant at the .05 level of confidence, confirmed Anderson's results. It would appear that when noun responses were called for, *S*s disregarded the primary class of the stimulus and produced nouns in great quantity.

However, when response-class was ignored and primary usage stimulus-class was examined separately, adjective-type stimuli elicited the greatest number of responses—regardless of whether those responses were nouns or adjectives. In fact, on output scores, response-class did not appear to make much difference for adjective stimuli (although it did affect commonality-of-association) as is clear in Table 1.

Despite the absence of an interaction, examination of within-cell means (see Table 1) suggested that two different processes were involved. When noun responses were called for, stimulus class made little difference. However, when adjective associations were demanded, stimulus-class was critical. Adjective associations to adjectives were provided as readily as were noun associations. However, the number of adjective-responses elicited by noun stimuli was significantly lower than for all other subgroups ($p < .05$ in all comparisons).

Comparable examination of within-cell commonality-of-association scores indicated that high output was not necessarily related to commonality of ideas. Adjective-class stimuli with noun responses had both the highest quantitative output and the lowest commonality of ideas (see Table 1).

The nature of the highly significant interaction (see Figure 1) indicated that when preferred class of stimulus usage had the same language structure

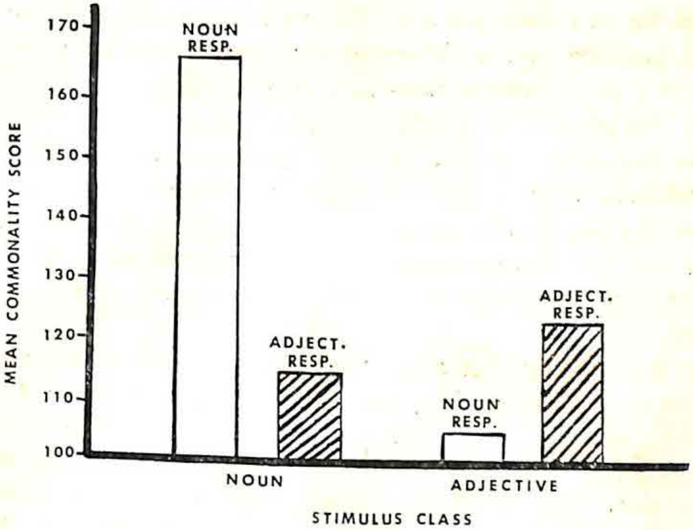

FIGURE 1
INTERACTION OF STIMULUS CLASS AND RESPONSE CLASS ON COMMONALITY MEASURES

as the type of demanded response, the most common associations were elicited. Thus nouns elicited commonplace noun associations and adjectives commonplace adjectives. The effect was greatest for the noun-noun group. Conversely, the most unique associative content was elicited when stimulus class and response class were opposite.

D. DISCUSSION

The results of the study permitted a number of limited generalizations. Assuming that quantity of output per unit time and high commonality-of-response were both indices of ease of association, both dependent variables reflected the same general picture. In general, when the language structure of the stimulus and the required response were the same, *S*s found association "easier" as evaluated by either measure.

The opposite was true on both measures for nouns, but not for adjectives. For adjective-class stimuli, commonality-of-response differentiated between response-class, but output scores did not. The reasons for this difference for the two types of stimulus class are not completely clear.

The findings with respect to noun stimuli and noun responses are in general accord with the findings of Davidon (2), Heidbreder and Zimmerman (5), Howes (6), Glanzer (4), and Fillenbaum, Jones, and Rapoport (3) whose studies utilized different methodologies and techniques. Most of these studies started from the fact that nouns are the most frequently-occurring words in the English language and made use of the assumption that such frequency would impart a major determinant-effect in association.

The fact that stimuli, the primary usage of which was adjectival, showed no difference in output regardless of language class may have reflected a shift in "primary" usage as the response demands were shifted. On the other hand, the fact that the commonality measures were consistent with those found for nouns suggested that this explanation is an oversimplification. It is apparent that more research is needed on the way in which adjective categories function in association.

If the general finding that associations were "easier" when stimulus and response class were congruent in grammatical structure is sustained by further research, there are also serious practical implications for use of traditional tests of "association." Such instruments are ordinarily focussed on the content which *S* connects with the stimulus word. The language structure of both the stimulus and the associated response are usually ignored. Yet, great emphasis is placed upon uncommon or atypical content responses. Because the present results indicate that uncommon responses will be maximized when the grammatical structure of the stimulus and response class are incongruent, the nature of such commonly-used instruments as the Kent-Rosanoff should be re-examined on this dimension.

Likewise, the results may be of some value in the current search for measures of creativity. In most studies encountered to date, creativity is at least partially equated with tendencies to give idiosyncratic, individualistic responses to stimuli. The finding that incongruent combinations of stimulus-usage and response-demands tend particularly to elicit such idiosyncratic associations suggests a possible technique for determining idiosyncratic "creative" tendencies in thought.

E. SUMMARY

Two conditions of stimulus-class (noun and adjective) were combined with two requirements of response class (noun and adjective) in a 2 × 2 factorial design. For forty *S*s, output was greatest and commonality of response highest when stimulus class and required response were congruent in language structure. Effects were greater for nouns than for adjectives. Output scores showed only main effects, whereas commonality scores yielded a significant interaction between stimulus and response class. The significance of incongruent language structure combinations for word-association tests and for creativity measures was also considered.

REFERENCES

1. ANDERSON, B. F. The influence of grammatical class on the production of ideas. In *The Psychology Experiment,* Los Angeles, Calif. Bertham Press, 1966.
2. DAVIDON, R. S. The effects of symbols, shift and manipulation upon the number of concepts attained. *J. Exper. Psychol.,* 1952, **44**, 70-79.
3. FILLENBAUM, S., JONES, L. V., & RAPOPORT, A. The predictability of words and their grammatical classes as a function of rate of deletion from a speech transcript. *J. Verb. Learn. & Verb. Behav.,* 1963, **2**, 186-194.
4. GLANZER, M. Grammatical category: A rote learning and word association analysis. *J. Verb. Learn. & Verb. Behav.,* 1962, **1**, 31-41.
5. HEIDBREDER, R., & ZIMMERMAN, A. Semantic efficiency: Some variables. *J. of Psychol.,* 1955, **40**, 325-335.
6. HOWES, D. On the relation between the probability of a word as an association and in general linguistic usage. *J. Abn. & Soc. Psychol.,* 1957, **54**, 75-85.
7. THORNDIKE, E. L., & LORGE, I. The Teacher's Word Book of 30,000 Words. New York: Bureau of Publications, Teachers College, Columbia University, 1944.
8. WEAVER, H. E., & MADDEN, E. H. "Direction" in problem solving. *J. of Psychol.,* 1949, **27**, 331-345.
9. Webster's New Collegiate Dictionary. Springfield, Ill.: G. C. Merriam Co., 1958.

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A TEST OF THE INVERTED-U HYPOTHESIS RELATING ACHIEVEMENT ANXIETY AND ACADEMIC TEST PERFORMANCE*

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A. INTRODUCTION

Several recent studies have reported evidence which has failed to support the usual contention that achievement tests should have their items sequenced so that they progress in difficulty, or at least have a few easy items at the beginning of the test (2, 6, 7). The primary basis for this contention is that easy items encountered early in the test tend either to dispel test-taking anxiety or increase motivation and thereby improve overall test performance. Although failing to find a general effect of item-difficulty sequencing, Munz and Smouse (6) found that test-taking anxiety interacts with item-difficulty sequencing to influence academic test performance. In explaining their findings, they formulated, *post hoc,* the hypothesis that individuals with different basic reactions to test-taking anxiety perform differentially on achievement tests in a manner described by the inverted-U performance curve which shows performance as a function of "arousal" or "drive." This explanation involves two assumptions: First, that item-difficulty sequences are progressively more arousing in the order of random, easy-to-hard, hard-to-easy, and second, that under typical achievement testing conditions the test reaction types have a characteristic position on the inverted-U curve. This paper reports an experimental test of the second assumption.

The test-taking reaction types are based on Alpert and Haber's (1) conception of test-taking anxiety as a two-dimensional construct: i.e., an anxiety process which debilitates test performance, and a separate anxiety process which facilitates performance. Alpert and Haber (1) have devised the Achievement Anxiety Test (AAT) to measure both types of anxiety. The AAT is a self-report instrument consisting of a Facilitation (AAT+) scale and a Debilitation (AAT—) scale. The reaction types are defined thus (6):

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"facilitators"—*S*s scoring relatively high on the AAT+ and relatively low on the AAT—; "debilitators"—*S*s scoring relatively low on the AAT+ and relatively high on the AAT—; "nonaffecteds"—*S*s scoring relatively low on both AAT+ and AAT—; and "high-affecteds"—*S*s scoring relatively on both AAT scales.

The hypothesized relationships among reaction types for the normal test-taking situation (random sequencing of test items) are depicted in Figure 1. It may be seen that although the nonaffecteds and the debilitators are expected to perform at about the same level, they are assumed to be at opposite ends of the arousal scale. It follows that lowered arousal would result in improved performance by the debilitators with nonaffecteds showing little or no difference. The opposite prediction would be made in the case of increased arousal or drive. Because of imprecision in the scaling of arousal and the peakedness of the curve, predictions regarding the facilitators and the high-affecteds under varying arousal levels are less firmly based and hence theoretically weaker. Nevertheless, by varying the condition of arousal (high, normal, and low) it is possible to make the following specific predictions: (*a*) Under normal arousal conditions, debilitators and nonaffecteds perform at a significantly lower level than high-affecteds and facilitators, and further, there is no difference between the nonaffecteds' and debilitators' performance and the high-affecteds' and facilitators' performance. (*b*) Arousal conditions (high, normal, and low) and anxiety reaction type (debilitators and nonaffecteds)

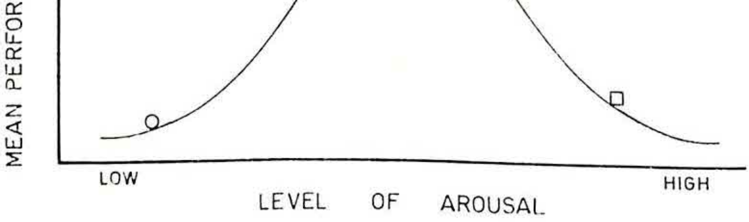

FIGURE 1

INVERTED-U CURVE SHOWING ACHIEVEMENT TEST PERFORMANCE AS A FUNCTION OF AROUSAL LEVEL

The superimposed plottings show mean performances of the four anxiety reaction types for the random sequence [after (6, p. 373)].

interact to affect test performance. (*c1*) Mean debilitator performance is significantly higher under the low arousal condition than under the normal arousal condition. (*c2*) Mean performances by the debilitators under the high and normal arousal conditions do not differ significantly. (*d1*) Mean performance by the nonaffecteds is significantly higher under the high arousal condition than under normal arousal conditions. (*d2*) Mean performances by the low-affecteds under low and normal arousal conditions do not differ significantly.

B. METHOD

1. *Subjects*

*S*s for this study were 120 students enrolled in the introductory educational psychology course at the University of Oklahoma; *S*s were selected from a total course enrollment of 242 students on the basis of AAT scores as described below.

2. *Instruments and Measures*

The dependent measure for this study was the *S*'s score on the final examination in the course indicated above. The final examination consisted of 100 randomly presented multiple-choice items. The independent measures consisted of the four achievement-anxiety reaction types and three arousal treatments.

The achievement anxiety types were defined on the basis of the AAT following the procedure of Munz and Smouse (6). The AAT, designed to measure the reported effects of anxiety experienced in test-taking situations, distinguishes between anxiety reported by the respondent as either facilitating or debilitating to test performance. Each type of anxiety is measured by a separate subtest of items (AAT+ scale and AAT— scale) together comprising a 19-item questionnaire. In this study, the procedure consisted of administering the AAT to all 242 course enrollees. For each student, the AAT— score was subtracted from the AAT+ score and the differences ranked. The top 30 students in this distribution were defined as the facilitators and the bottom 30 as debilitators. Scores for the remaining students were summed. The 30 students with the greatest sums were defined as high-affecteds, while the 30 with the smallest sums became the nonaffecteds.

Three levels of arousal—a low arousal group (LAG), a normal group (NAG), and a high arousal group (HAG)—were operationally defined as follows. For the NAG the final examination was administered in a typical, straightforward manner. In the HAG, the examination was given under conditions designed to be anxiety provoking. The examiner arrived five minutes late to the examination and proceeded in a threatening manner to inform the *S*s (contrary to actuality) that at the very last minute it had been discovered that certain students had secured copies of the exam, with the result that a new test which included "items taken from the more obscure sections of the lectures and assigned readings" had to be hurriedly constructed. In addition, two proctors continuously circled the examination room periodically peering over students' shoulders. [For a comprehensive explanation of the anxiety-provoking procedure and discussion of the ethical safeguards, see (9).]

The treatment for the LAG consisted of using a special format for the examination wherein the same 100 items were presented in the same order, however, the items were presented on only the left half of the page, the other half being blank. The instructions given on the examination were "Circle the best answer for each item. Feel free to make any comments about the items in the space provided." The setting up of these conditions has been found to reduce test-taking anxiety (4, 5). All testing groups were given ample time to complete the examination.

3. *Procedure and Design*

The AAT was administered 10 days prior to the course final examination. After the 30 *S*s of each reaction type were identified by the procedure described above, *S*s from each group were randomly assigned to one of three subgroups which, in turn, were randomly designated to receive one of the three arousal treatments. After the final examination had been administered and scored, the data (total number of items answered correctly) were subjected to two analyses of variance. The first analysis was a 3 (arousal condition) by 4 (achievement anxiety reaction type) analysis of variance, with 10 *S*s in each of the 12 cells. The second analysis was a reanalysis with the use of only the debilitators' and nonaffecteds' data derived under the three arousal conditions. The *t* tests between means (3, pp. 112-114) following the analyses of variance were regarded as individual comparisons, since specific *a priori* outcomes had been predicted.

C. RESULTS

The summary table for the first analysis of variance is shown in Table 1. A significant main effect for reaction type was evidenced at the .05 level of significance, while no significant interaction materialized. Individual comparisons within this analysis partially supported Hypothesis *a* in that within the

TABLE 1
ANALYSIS OF VARIANCE SUMMARY FOR PERFORMANCE SCORES AS A FUNCTION OF AROUSAL TREATMENT AND ACHIEVEMENT-ANXIETY TYPE

Source of Variation	*df*	*MS*	*F*
Arousal treatments (A)	2	204.77	2.76
Achievement-anxiety types (B)	3	258.47	3.48*
A × B	6	89.10	1.20
Error	108	74.15	
Total	119		

* $p < .05$.

NAG only the debilitators performed at a significantly lower level than the high-affecteds and facilitators ($p < .05$). As predicted, however, there was no significant difference between the debilitators' and nonaffecteds' mean performance ($p > .05$) and the facilitators' and high-affecteds' mean performance ($p > .05$).

The summary table for the second reanalysis of variance is presented in Table 2. As shown in this table, the predicted interaction failed to materialize. However, comparison data supported hypotheses *C1* and *C2* in that the debilitators' mean performance was significantly higher under the low arousal conditions than under normal and high arousal conditions ($p < .05$) but did not differ between the latter two conditions ($p > .05$). Comparison data for the nonaffecteds across arousal conditions yielded no significant t ratios ($p > .05$). Thus, these findings supported Hypothesis *D2*, but not *D1* which predicted that the nonaffecteds' performance would be significantly higher under the high arousal condition.

TABLE 2
REANALYSIS OF VARIANCE SUMMARY FOR PERFORMANCE SCORES AS A FUNCTION OF AROUSAL TREATMENTS AND ACHIEVEMENT-ANXIETY TYPE

Source of Variation	*df*	*MS*	*F*
Arousal treatments (A)	2	74.02	1.18
Achievement-anxiety types (B)	1	198.01	3.14*
A × B	2	108.22	1.72
Error	54	62.96	
Total	59		

* $p < .05$.

D. DISCUSSION

Munz and Smouse (6) were able to manipulate the performances of all the personality reaction types except the debilitators by varying item difficulty sequencing which they assumed mediated arousal: that is, by increasing test-taking arousal. Hence, the differential performance by the debilitators across arousal conditions (Hypotheses *C1* and *C2*) in this study provides strong support for the inverted-U explanation. By contrast, failure to obtain a significant overall interaction between reaction type and arousal condition in either of the major analyses, suggests that refinements in method or hypotheses or both may be in order. A repeated measures design in which each reaction type group received all three levels of arousal would seemingly yield a more sensitive test of the inverted-U hypothesis. In such a design specific predictions about all four reaction types under the different arousal conditions could be made.

A comparison of Figures 1 and 2 shows that under usual testing conditions (normal arousal) performances of the various reaction types as found in this study order themselves on the curve as predicted from the theoretical model except for a small relative increase in the nonaffecteds' performance. Moreover, Figure 2 shows that the fluctuations of the nonaffecteds' performance under the three arousal conditions, while not statistically significant (Hypotheses *D1* and *D2*), are in the direction predicted by the inverted-U notion.

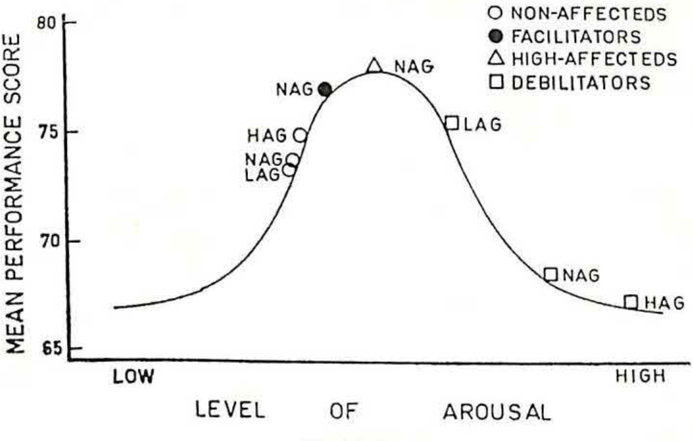

FIGURE 2

Inverted-U Curve Representing Mean Performance Scores as a Function of Arousal Levels for the Four Achievement Anxiety Types in the Normal Arousal Group and for the Debilitator and Nonaffected Anxiety Types in the Low and High Arousal Groups

The practical implications of this study are straightforward: First, identify students as to their test-taking reaction. For this, norms for the AAT or a similar device would be superior to the ranking methods used in this study. Secondly, maximize the content validity of a given student's performance by manipulating either test format, testing conditions, or both (8).

E. SUMMARY

In order to test the assumption that the inverted-U hypothesis which shows performance as a function of arousal mediates the relationship between achievement anxiety reaction type and achievement test performance, college freshmen were classified as to anxiety type and were administered a final examination under conditions of high, normal, or low arousal. Differential performances, in part, supported the predicted relationships: that is, (*a*) within the normal arousal group debilitators performed at a significantly lower level than the high-affecteds and facilitators, while no significant differences were found between the debilitators' and nonaffecteds' mean performance and the facilitators' and high-affecteds' mean performance; and (*b*) the debilitators' mean performance was higher under the low arousal condition than under the normal and high arousal condition but did not differ in the latter two conditions. While not significantly different, the nonaffecteds' performance under the three arousal conditions was in the direction predicted by the inverted-U. Implications of the research were discussed.

REFERENCES

1. ALPERT, R., & HABER, R. N. Anxiety in academic achievement situations. *J. Abn. & Soc. Psychol.*, 1960, **61**, 207-215.
2. BRENNER, M. H. Test difficulty, reliability, and discrimination as functions of item difficulty order. *J. Appl. Psychol.*, 1964, **48**, 98-100.
3. BRUNING, J. L., & KINTZ, B. L. Computational Handbook of Statistics. Chicago, Ill.: Scott, Foresman, & Co., 1968.
4. CALVIN, A., MCGUIGAN, F., & SULLIVAN, M. A further investigation of the relationship between anxiety and classroom examination performance. *J. Educ. Psychol.*, 1957, **48**, 240-244.
5. MCKEACHIE, W., POLLIE, D., & SPEISMAN, J. Relieving anxiety in classroom examination. *J. Abn. & Soc. Psychol.*, 1955, **50**, 93-98.
6. MUNZ, D. C., & SMOUSE, A. D. Interaction effects of item difficulty sequence and achievement anxiety reaction on academic performance. *J. Educ. Psychol.*, 1968, **59**, 370-374.
7. SMOUSE, A. D., & MUNZ, D. C. The effects of anxiety and item difficulty sequence on achievement testing scores. *J. of Psychol.*, 1968, **68**, 181-184.
8. ———. Item difficulty sequencing and response style: A follow-up analysis. *Educ. & Psychol. Meas.*, 1969, **29**, 469-472.
9. SWEENEY, C. J. The effects of stress levels and achievement anxiety personalities on academic performance. Unpublished Doctoral dissertation, University of Oklahoma, Norman, Oklahoma, 1968.

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